International Journal of American Linguistics

VOLUME XXII October, 1956 NUMBER 4

THE CHRONOLOGY OF THE ATHAPASKAN LANGUAGES

HARRY HOIJER

UNIVERSITY OF CALIFORNIA, LOS ANGELES

1. Use of glottochronology
2. Items of meaning
3. Lists used in present study
4. Components in the formula $t = \log C \div r^2$
5. Athapaskan languages examined
6. Transcription used
7. Northern languages
8. Pacific coast languages
9. Apachean languages
10. Results of comparison of Apachean
11. Results of comparison of Pacific coast
12. Results of comparison of northern languages
13. Time divergence between Apachean, and northern and Pacific coast areas
14. Time divergence between Pacific coast and northern languages
15. Conclusion
16. Bibliography

The methods of glottochronology (lexicostatistic dating) may be summarized briefly in the following terms. Details will be found in Swadesh 1951, 1955 and Lees, 1953 (see bibliography).

1. Glottochronology is a means of establishing approximate dates of separation of contemporaneous languages known to be members of a single linguistic stock or family. The method is of obvious importance to Americanists (and to others who work with so-called primitive languages) for it is precisely in these fields that we lack documented historical records.

2. The method is based upon the discovery that languages apparently change at a uniform rate, and that this rate can be quantified by an examination of that portion of the vocabulary (or lexicon) of a language which expresses universal and essentially non-cultural meanings. Lexicostatistic methodology assumes that all languages must of necessity express certain items of meaning (indicative of culture universals) and that all languages will express those items (or most of them) by simple words or morphemes which are part of the common, everyday vocabulary. (For a recent critique of this assumption, see Hoijer, 1956.)

3. The basic meanings above referred to, as first compiled (Swadesh 1952. 456–457), numbered 200. Later, for various reasons, Swadesh (1955) divided this list into two groups of 100 each. The first of these is the preferred list, to be used where possible; the second a supplementary list, and its items are to be used only when it proves difficult or impossible to translate particular items of the preferred list.

In the study which follows it was possible to use only 78 items of the preferred list, largely because adequate lexical data for the languages treated were unavailable. To provide a list of 100 items, I therefore added 32 from the supplementary list. The items used, expressed by brief English meanings, are given below. Each item is numbered for later reference.

(1) I, (2) thou, (3) we, (4) many, (5) one (the numeral), (6) two, (7) big, (8) long, (9) small, (10) woman, (11) man, (12) fish, (13) dog, (14) louse, (15) tree, (16) leaf, (17) meat, (18) blood, (19) bone, (20) grease, (21) egg, (22) horn (of animals), (23) tail, (24) feather, (25) hair.

(26) head (body part), (27) ear, (28) eye, (29) nose, (30) mouth, (31) tooth, (32) tongue (33) claw, (34) foot, (35) knee, (36) hand, (37) belly (or stomach), (38) neck, (39) breast (of females), (40) heart, (41) drink (vb.), (42) eat, (43) bite (vb.), (44) see, (45) hear, (46) sleep, (47) die, (48) kill, (49) swim, (50) fly (vb.).

(51) lie (one person lies; in our Athapaskan lists), (52) sit (one sits, in Athapaskan), (53) stand, (54) say, (55) sun, (56) moon, (57) star, (58) water, (59) rain, (60) stone, (61) sand, (62) earth, (63) cloud, (64) smoke (noun), (65) fire (noun), (66) ash, (67) burn, (68) path, (69) red, (70) green, (71) yellow, (72) white, (73) black, (74) night, (75) hot (e.g. of the weather).

(76) cold (e.g. of the weather), (77) full, (78) name (noun), (79) three, (80) four, (81) day, (82) fog, (83) wind, (84) flow, (85) wash, (86) worm, (87) leg, (88) arm (89) lip, (90) guts (intestines), (91) saliva, (92) grass, (93) mother, (94) father, (95) ice, (96) snow, (97) rotten, (98) smell (perceive odor), (99) fear (vb.), (100) rope.

4. By translating their list into different historical stages of single languages (e.g. Old English and Modern English), Swadesh and Lees have discovered that stages separated by 1000 years exhibit, on the average, about 81 retentions out of 100; i.e. an index of retention (denoted by r) of about 81%. This means that a modern language (A), derived directly from a language (B) spoken 1000 years ago, will have about 81 forms (words or morphemes) out of the 100 which make up the test list, each of which is cognate to a form in language (B) which expresses the same item of meaning. The average rate of retention (r) is determined (as yet imperfectly) from tests made in only thirteen documented languages. (See Lees, 1953 and Swadesh, 1955, especially p. 122.)

If a single language diverges into two distinct idioms over a period of 1000 years, each of the modern vocabularies will retain about 81% of the common earlier vocabulary. But they need not of course retain the same items; the changes in the two divergent languages are assumed to be independent of each other. By the law of chance, the percentage of cognates between the two modern tongues should be 81% of 81%, or 66%.

To determine, then, the time of separation (t) of two contemporaneous languages of the same linguistic family, we (1) translate the test list into both languages, (2) compare the two lists to determine the percentage of cognates shared (this percentage is denoted by C), and (3) work out the date by means of the formula: $t = \log C \div \log r^2$ (see Swadesh 1952, 1955 and Lees, 1953, for details).

5. The languages examined in this paper all belong to the Athapaskan stock of North America. Fifteen languages are studied:

Beaver, Carrier, Chipewyan, Hare, Kutchin, and Sarcee, spoken in various regions of the Canadian Northwest and Alaska, and Galice, spoken in Oregon. Data on Kutchin and Hare come from Petitot (1876), Chipewyan from Li (1933a), Beaver from Goddard (1916), Carrier from Morice (1932), Sarcee from Edward Sapir's field notes (ms.), and Galice from manuscript texts kindly placed at my disposal by Melville Jacobs.

Hupa, Mattole, and Kato, spoken in northern California. Hupa data come from Edward Sapir's field notes (ms.), Mattole from Li (1930), and Kato from Goddard (1912).

Navaho, Chiricahua, San Carlos, Jicarilla, and Lipan, the Apachean languages spoken in New Mexico and Arizona. Navaho data come from Edward Sapir's field notes (ms.) and that on the remaining Apachean languages from my own (unpublished) field notes.

Comparative studies in Athapaskan, as yet incomplete, are found in Hoijer, 1938, Li, 1930, 1933b, and Sapir, 1925. I also made good use of Sapir's Na-Dene comparative dictionary (ms.).

6. Translations of the test list given in §**3**, for each of the fifteen Athapaskan languages, appear below. To simplify comparison between the lists, I have used a uniform phonetic transcription, transliterating from the original sources where possible. The symbols employed are in general those described by Ḥerzog, et. al., 1934. Exceptions: long vowels are represented by doubled vowels (e. g., aa); apico-alveolar interdental affricates are written with the digraphs tθ (voiceless), dδ (voiced), and tθ' (glottalized); nasalized vowels are indicated by raised n (e.g., aⁿ). Certain sounds in Hare, written kfw and fw by Petitot (1876), are retained as he gives them; kfw is perhaps k followed by a voiceless bilabial spirant, fw is probably the voiceless bilabial spirant (Sapir, 1914, 285, fn 27).

Most of the items in the list are translatable by single morphemes; those preceded by a hyphen are bound. In some instances whole words are given; where data are available these are divided by hyphens into their constituent morphemes. Each term is numbered to correspond with the English forms listed in §**3**.

7. The lists for the northern languages are given in the following order: Beaver, Carrier, Chipewyan, Hare, Kutchin, Sarcee, Galice. Each of these probably represents a distinct substock, but Beaver and Sarcee are sometimes put together in a single substock.

BEAVER. (Only 82 items.) (1) sai, (2) nai, (3) naxa-, (4) łoⁿ, (5) ła-, (6) ooŋkii, (7) -čiik', (8)—, (9)—, (10) č'ege, (11) dəne, (12) łuuge, (13) łiⁿʔ, (14) yaʔ, (15) da-čin, (16) t'oo, (17) c'ən', (18) dəl, (19) -c'əneʔ, (20) łeš, (21)—, (22) -deʔ, (23) -čeʔ, (24) t'a, (25) -γaʔ.

(26) -ciiʔ, (27) -čəgeʔ, (28) -daiʔ, (29) -n-woⁿʔ, (30) -zaʔ, (31) -wooʔ, (32) -cuudii, (33) -goneʔ, (34) -keʔ, (35) —, (36) -n-laʔ, (37) -bad, (38) -k'iis, (39) —, (40) -ǯeʔ, (41) -doⁿ (< -d-noⁿ), (42) -da (< -d-ya), (43) -ʔat', (44) -ʔiⁿ, (45) -c'ək, (46) —, (47) -c'iid, (48) -xai, (49) -beł, (50) -t'əg.

(51) -tii, (52) -da, (53) -zəd, (54) -dii, (55) šah, (56) šah, (57) sən', (58) tuu, (59) čoⁿh, (60) ceh, (61) —, (62) nən, (63) k'oos, (64) łəd, (65) kon', (66) xoo-λiš, (67) -k'on, (68) təne, (69) —, (70) —, (71) —, (72) -k'ał, (73) -zən, (74) xuX'e, (75) siił.

(76) -k'əc, (77) —, (78) -ye, (79) ta-č'eh, (80) diiye-č'eh, (81) ʒene, (82) —, (83) in-č'i. (84) —, (85) —, (86) —, (87) -ǯade, (88) -goone?, (89) -ye-daʔ, (90) —, (91) —, (92) ł'ook' (read: X'ook' ʔ), (93) -mo, (94) -taʔ, (95) es-təne, (96) yas, (97) —, (98) -čən, (99) -ǯid, (100) ł'uuł (read: X'uuł ʔ).

CARRIER. (1) si, (2) nen, (3) xweni, (4) łanɛ, (5) i-łǫ, (6) nankɛ, (7) -čo, (8) niiδ, (9) -yaz, (10) c'eeke, (11) dene, (12) łǫ, (13) łi, (14) yaʔ, (15) čen, (16) -t'an, (17) -ceŋ, (18) delel, (19) -tθ'en, (20) γe, (21) -γeez, (22) -de, (23) -če, (24) -t'a, (25) -γa.

(26) -tθi, (27) -ʒo, (28)-na, (29) -n-cis, (30) -δe, (31) -γu, (32) e-cula, (33) -gei, (34) -ke, (35) -gwed, (36) -la, (37) -bed, (38) -k'es, (39) -tθ'uu, (40) -ʒi, (41) -nai, (42) -ʔał, (43) -γaz, (44) -ʔen, (45) -c'ai, (46) -ti, (47) -cai, (48) -γe, (49) -bih, (50) -t'ah.

(51) -ti, (52) -da, (53) -yin, (54) -nih, (55) sa, (56) sa, (57) sem (read: sen ʔ), (58) tuu, (59) čan, (60) tθe, (61) θai, (62) yen, (63) k'wes, (64) łed, (65) kwen, (66) xeł-c'ih, (67) -k'en, (68) ti, (69) deł-k'en, (70) deli, (71) del-co, (72) ł-yel, (73) deł-ges, (74) γeł, (75) nel-γwes.

(76) -k'wez, (77) -ben, (78) uu-zi, (79) ta, (80) denge, (81) ʒin, (82) ʔa, (83) nił-c'i, (84) ———, (85) -deh, (86) es-gu, (87) ke-čen, (88) -gan, (89) -da, (90) -c'i, (91) neδe-tu, (92) X'o, (93) -lu, (94) -ba, (95) ten, (96) yeθ, (97) ł-xed, (98) -cen, (99) nez-xed, (100) X'uł.

CHIPEWYAN. (Acute accent stands for high pitch; unmarked syllables have low pitch.) (1) si, (2) nən, (3) nuhni, (4) łaⁿ, (5) łá, (6) nakɛ, (7) -čoγ, (8) -néδ, (9) yaze, (10)

c'ékuyi, (11) dəne, (12) łuwɛ, (13) łiⁿ, (14) yá, (15) dɛ-čin, (16) -t'áⁿ, (17) -tθə́n, (18) dəł, (19) -tθ'ənέ, (20) ƛɛs, (21) -γézέ, (22) -dέ, (23) -čέ, (24) -t'a, (25) -yá.

(26) -tθí, (27) -ʒaγá, (28) -naγá, (29) -ń-ciⁿ, (30) -δe, (31) -γú, (32) -tθu, (33) -ganέ, (34) -kέ, (35) -cá-gwór, (36) -n-lá, (37) bór, (38) -k'woδ, (39) -tθ'uwέ, (40) -ʒiyέ, (41) -daⁿ (< -d-naⁿ), (42) -tiⁿ, (43) -xáiθ, (44) -ʔiⁿ, (45) -tθ'aγ, (46) -ław, (47) -δir, (48) -δir, (49) -bí, (50) -t'a.

(51) -tiⁿ, (52) -da, (53) -yiⁿ, (54) -ni, (55) sa, (56) sa, (57) tθə́n, (58) tu, (59) čaⁿ, (60) tθɛ, (61) θai, (62) níⁿ, (63) k'woθ, (64) lər, (65) kún, (66) łéz, (67) -k'áih, (68) -tən-ɛ, (69), -k'wóz, (70) -ƛ'ɛz, (71) -tθoγ, (72) -gai, (73) -zən, (74) təδ-ɛ, (75) -du.

(76) -k'aδ, (77) -ʔaⁿ, (78) -n-zí, (79) taγe, (80) diⁿγiⁿ, (81) -ʒiⁿ, (82) cɛł, (83) nił-c'i, (84) -liⁿ, (85) -dέ, -dɛ, (86) gu (from Le Goff, 1916), (87) -ʒaré, (88) -ganέ, (89) -da, (90) -c'iyέ, (91) sɛγ, (92) ƛ'oγ, (93) -nέ, (94) -tá, (95) tən, (96) yaθ, (97) -ʒer, (98) -cən, (99) -ʒɛr, (100) ƛ'ulɛ.

HARE. (1) seni, (2) ne, (3) naxeni, (4) iⁿƛoⁿ, (5) iⁿłege, (6) naoke, (7) -čoo, (8) ee-dew, (9) e-yaⁿ, (10) c'elinɛ, (11) dɛnɛ, (12) ługe, (13) ƛiⁿ, (14) ya, (15) de-čiⁿ, (16) iⁿt'oⁿ, (17) kfweⁿ, (18) e-delɛ, (19) e-k'wenɛ, (20) e-γe, (21) e-γie, (22) e-de, (23) e-če, (24) t'a, (25) e-γa.

(26) e-kfwĩ, (27) e-ʒie, (28) e-dʸa, (29) iⁿ-γoⁿ, (30) fwa, (31) e-γu, (32) e-wari, (33) -gone, (34) e-ke, (35) e-go, (36) -la, (37) e-bə, (38) e-k'o, (39) -t'oy, (40) e-ʒee, (41) ee-doⁿ, (42) i-ye, (43) -čoo, (44) -ʔi, (45) -k'wey, (46) -ti, (47) -fwi, -fwer, (48) -xe, (49) ee-bie, (50) -t'a.

(51) -ti, (52) -da, (53) -ʔa, (54) -di, (55) sa, (56) sa, (57) fweⁿ, (58) tu, (59) -čoⁿ, (60) kfwɛ, (61) fwa, (62) ne, (63) k'o, (64) -lere, (65) koⁿ, (66) łe, (67) -k'oⁿ, (68) nade-tene, (69) di-ci, (70) de-λey, (71) de-kfwoy, (72) de-gay, (73) de-k'ɛze, (74) tɛwɛ, (75) go-wele.

(76) -k'awɛ, (77) -ʔoⁿ, (78) iⁿ-zi, (79) tage, (80) dinyi, (81) ʒinɛ, (82) ʔa, (83) niⁿ-c'i, (84) ni-liⁿ, (85) -si, (86) gu, (87) e-ʒarɛ, (88) e-gone, (89) e-da-γəi, (90) e-c'ie, (91) e-zie, (92) ƛ'o, (93) e-xoⁿ, (94) e-ta, (95) tʸeⁿ, (96) žʸa, (97) in-ǯied, (98) de-či, (99) -ǯer, (100) λu.

KUTCHIN. (= Petitot's Loucheux.) (1) si, (2) ŋaⁿ, (3) nuγwun, (4) leⁿ, (5) iⁿ-łagə, (6) nakəⁿ, (7) -čoo, (8) ni-nǯiw, (9) i-zʸiuⁿ, (10) c'e-nǯoo, (11) di-nǯie, (12) ługu, (13) łeⁿ, (14) zʸie, (15) də-čan, (16) a-t'an, (17) tθen, (18) da, (19) -tθ'ən, (20) -δey, (21) a-γwo, (22) e-dʸi, (23) -čʸi, (24) t'e, (25) ə-γe.

(26) i-či, (27) e-ʒey, (28) ə-nde, (29) ə-n-ciⁿ, (30) šɛd, (31) a-γwo, (32) i-ča, (33) -kay, (34) -kɛ, (35) -gwod, (36) -n-le, (37) -vəd, (38) -k'o, (39) t'agu, (40) -ʒʸi, (41) -ǯił, (42) -ʔəł, (43) -čʸid, (44) -ʔin, (45) -tθ'eg, (46) -či, (47) -δəd, (48) -γey, (49) -vi, (50) -t'a.

(51) -či, (52) -die, (53) -ʔe, (54) -ŋo, (55) sie, (56) sie, (57) sən, (58) tioⁿ, (59) -čʸin, (60) či, (61) sey, (62) nən, (63) k'o, (64) -lade, (65) kwon, (66) łeδ, (67) -k'i, (68) na-taⁿeⁿ, (69) di-cig, (70) a-λow, (71) di-tθow, (72) da-gay, (73) -zʸeⁿ, (74) taδ, (75) -δu.

(76) -k'aδ, (77) -ʔeⁿ, (78) -o-zʸi, (79) tieg, (80) dan, (81) ʒʸin, (82) -ʔeg, (83) a-c'ey, (84) ŋe-leⁿ, (85) -ǯie, (86) -gioⁿ, (87) -ʒiedi, (88) e-giin, (89) i-de-va, (90) e-c'ig, (91) e-zʸig, (92) ƛ'o, (93) e-ʔ-xen, (94) -tieⁿ, (95) tan, (96) zʸiow, (97) -ǯed, (98) -cen, (99) -ǯed, (100) λa.

SARCEE. (The acute accent indicates high tone, the grave accent low tone; unmarked syllables have middle tone.) (1) síni, (2) níni, (3) nááni, (4) -ƛα(n-), (5) ƛik'azá, (6) akfiʔ, (7) -čóó, (8) -nààz, (9) -cìƛ'aa, (10) c'iká, (11) diná, (12) ƛúk'á, (13) ƛí, (14) yàʔ, (15) i-čí, (16) i-t'ɑ́ɑ́sí, (17) álíní, (18) -diλ-, (19) -c'ín, (20) -yáhàʔ, (21) -yàs, (22) -daʔ, (23) -čàʔ, (24) t'àh, (25) -yaʔ.

(26) -cìʔ, (27) -ʒiγ, (28) -nàγ, (29) -cì, (30) -zɑ́ʔ, (31) -yòòʔ, (32) -còʔ, (33) -gɑn-, (34) -kàʔ, (35) -gud-, (36) -lɑ́ʔ, (37) -mìʔ, (38) -k'ús, (39) -c'ow-, (40) -ʒàyàní, (41) -nɑ́(n-), (42) -na, (43) -yɑ́s, (44) -ʔí(n-),

(45) -c'á(n-), (46) -tí(n-), (47) -càà, (48) -γà, (49) -máh, (50) -t'áh.

(51) -tí(n-), (52) -dá, (53) -zí$^{?}$, (54) -ní, (55) č'àà t'áγá, (56) yiináγá, (57) sòh, (58) tú, (59) -čá(n-), (60) cá, (61) cáʒìł, (62) ni, (63) nàk'ús, (64) ƛi, (65) kò$^{?}$, (66) cídàgòƛìsà$^{?}$, (67) -k'á(n-), (68) ástì-, (69) -k'ááz, (70) -k'us, (71) -cúú, (72) -gáí, (73) -zìní, (74) xìł, (75) -di(n-).

(76) -k'ás, (77) -c'ist, (78) -í-zì$^{?}$, (79) á-táá, (80) diič'í, (81) ʒínìs, (82) —, (83) -c'i, (84) -lí(n-), (85) -cſł, (86) nàdúzíyá, (87) -γòs, (88) -gàn, (89) -dα-, (90) -čá(n-), (91) -záí, (92) gùƛ'òwú, (93) -ná, (94) -tà$^{?}$, (95) nìstiní, (96) zàs, (97) -ʒí$^{?}$(d-), (98) -ciìn, (99) -ʒi$^{?}$(d-), (100) ƛ'úł.

GALICE. (Only 89 items available.) (1) šii, (2) nan, (3) dawa-, (4) ła^{n}a^{n}, (5) ła$^{?}$, (6) nadei, (7) -čuh, (8) -des, (9) ist'an', (10) c'a^{n}a^{n}kei, (11) dadei, (12) łuuk'e, (13) ła^{n}$^{?}$, (14) ya$^{?}$, (15) čan, (16) t'a^{n}i^{n}, (17) saN', (18) dał, (19) c'an, (20) k'ah, (21) weisei$^{?}$, (22) -dei$^{?}$, (23) -čii, (24) -t'ai$^{?}$, (25) -γaa.

(26) -sii$^{?}$, (27) -saai, (28) -daai, (29) miišaš, (30) -da$^{?}$, (31) -gu$^{?}$, (32) —, (33) -gwan-yu, (34) -ki$^{?}$, (35) -gwai$^{?}$, (36) -la$^{?}$, (37) bai$^{?}$, (38) k'was, (39) c'awei$^{?}$, (40) -siiyi$^{?}$, (41) -naa, (42) -ya, (43) -dei, (44) -$^{?}$i^{n}, (45) -c'ei, (46) -laal, (47) -c'id, (48) gei, (49) -t'uh, (50) -t'ah.

(51) -ti^{n}, (52) -da, (53) -gi$^{?}$, (54) -ni, (55) šaa, (56) yalsi, (57) yasan, (58) tuu-, (59) naiyaa, (60) sei, (61) s-dai, (62) nandei, (63) -$^{?}$ak-, (64) ład, (65) kwan, (66) č'as, (67) -k'ał, (68) tadei, (69) —, (70) —, (71) —, (72) -gai, (73) —, (74) ƛe$^{?}$, (75) -sał.

(76) -k'aas, (77) -maN, (78) -uu-ši$^{?}$, (79) taa-, (80) dan-, (81) sinis, (82) —, (83) ł-c'i^{n}i^{n}, (84) —, (85) —, (86) —, (87) c'an, (88) gwaani$^{?}$, (89) —, (90) č'iič'e$^{?}$, (91) —, (92) ƛ'uu, (93) -na$^{?}$e, (94) -ta$^{?}$, (95) tan, (96) yas, (97) $^{?}$i^{n}ł-c'aa, (98) -sa^{n}a^{n}, (99) -ʒat, (100) ƛ'uuli.

(I have somewhat arbitrarily grouped Galice as a 'northern' language. There is perhaps as much justification for classing it with the Pacific Coast group.)

8. The Pacific Coast languages are listed in the following order: Hupa, Kato, Mattole.

HUPA. (1) Wee, (2) niŋ, (3) nehee, (4) łaan-, (5) ła$^{?}$- (6) nahxi, (7) -k^{y}oh, (8) -nees, (9) -yaaW, (10) camehsƛ'oon, (11) xo$^{?}$sday, (12) łook', (13) liŋ, (14) ya$^{?}$, (15) $^{?}$is-k^{y}iŋ, (16) -t'aŋ', (17) -ciŋ', (18) ceeliŋ, (19) -c'iŋ', (20) k'^{y}eewe$^{?}$, (21) -weeWe$^{?}$, (22) -de$^{?}$, (23) -k^{y}e$^{?}$, (24) -č'ile$^{?}$, (25) -wa$^{?}$.

(26) -eeda$^{?}$ay, (27) -ʒiW', (28) -naa$^{?}$, (29) -n-č^{w}iW, (30) -sa$^{?}$, (31) -wo$^{?}$. (32) -saastaan, (33) -k^{y}ec', (34) -xe$^{?}$, (35) -got', (36) -la$^{?}$, (37) -mit', (38) -k'os, (39) -c'oo$^{?}$, (40) -k^{y}ans$^{?}$aan, (41) -naan, (42) -yaan, (43) -xac', (44) -$^{?}$iŋ, (45) -c'in, (46) -k^{y}iwiŋa$^{?}$an, (47) -č'id, (48) -wen, (49) -me$^{?}$, (50) -t'aw.

(51) -teen, (52) -dah, (53) -yeen, (54) -nee, (55) Waa, (56) Waa, (57) ciŋ', (58) too, (59) naanyai, (60) cee, (61) łič'iW, (62) nin', (63) $^{?}$ah, (64) łid, (65) xoŋ', (66) xoŋ'-din, (67) -lid, (68) tin, (69) -ceeli, (70) -cow', (71) -cow', (72) -gay, (73) -Win, (74) xa-ƛ'e$^{?}$, (75) -seel.

(76) -k'ac', (77) -miŋ, (78) -oo-We$^{?}$, (79) taak', (80) diŋk', (81) ʒeenis, (82) mišʒee, (83) tehšč'aa, (84) -liŋ, (85) -deh, -diw, (86) goo, (87) -c'iŋ', (88) -k'^{y}aŋ$^{?}$ai, (89) -da$^{?}$, (90) -č'eek'^{y}e$^{?}$, (92) ƛ'oh, (93) -anč^{w}iŋ, (94) -ta$^{?}$, (95) miŋxostiŋ, (96) nandil, (97) -g^{y}ide$^{?}$, (98) -č^{w}e$^{?}$n, (99) -g^{y}id, (100) ƛ'ohł.

KATO. (Only 94 items.) (1) šii, (2) niŋ, (3) nehiŋ, (4) -łaŋ, (5) łaha$^{?}$, (6) naka$^{?}$, (7) -čoo, (8) -nes, (9) -yaš, (10) č'ek, (11) nənkadəŋ, (12) łook', (13) -łoo, (14) ya$^{?}$, (15) čən, (16) —, (17) -səŋ', (18) seelin, (19) c'əŋ, (20) k'wah, (21) -weešii, (22) -de$^{?}$, (23) -čii$^{?}$, (24) t'a$^{?}$, (25) -ga$^{?}$.

(26) -sii$^{?}$, (27) -č'ge$^{?}$ (read: -čəge$^{?}$ $^{?}$), (28) -na$^{?}$, (29) -unč, (30) -da$^{?}$, (31) -woo$^{?}$, (32) -soo$^{?}$, (33) —, (34) -kwe$^{?}$, (35) -qoot', (read: -goot' $^{?}$), (36) -la$^{?}$, (37) -bət', (38) -t'ai, (39) —, (40) -ʒii$^{?}$, (41) -nan, (42) -yan, (43) -gəc, (44) -$^{?}$iŋ', (45) -c'eg, (46) -lal, (47) -dən, (48) -giŋ, (49) -be, (50) -t'ag.

(51) -tiŋ, (52) -da, (53) -yiŋ, (54) -nii, (55) ša, (56) nagai, (57) sən, (58) too, (59)

-biil', (60) se, (61) sai, (62) neʔ, (63) ʔah, (64) łəd, (65) kooŋ', (66) —, (67) -k'an, (68) tən-nii, (69) -čiiʔ, (70) -coo, (71) -coo, (72) -gai, (73) -šiin', (74) Leʔ (read: ƛ'eʔ ʔ), (75) -səl.

(76) -təŋ, (77) -bəŋ', (78) -yii, (79) tak', (80) nakaʔ-nakaʔ, (81) ǯiŋ, (82) yist'oot, (83) -čii, (84) -liŋ, (85) -deg, -deh, (86) qoo (read: goo ʔ), (87) -woos, (88) -kwane (read: -gwane ʔ), (89) —, (90) -ǯiik'eʔ, (91 šek', (92) Looh (read: ƛ'ooh ʔ), (93) -nan, (94) -taʔ, (95) -təŋ, (96) yas, (97) —, (98) -čən, (99) -git (read: -gʸid ʔ), (100) beł.

MATTOLE. (Only 99 items.) (1) šii, (2) niŋ, (3) nohniŋ, (4) łaan-, (5) laihaʔ, (6) nakeh, (7) -čʸah, (8) -nees, (9) -yaax, (10) yaŋkeh, (11) gaʔteen, (12) łook'eh, (13) naaƛ'ii, (14) yaʔ-, (15) čʸiŋ, (16) t'aŋ', (17) -xin-, (18) -ceelin, (19) -c'in-, (20) kee, (21) -ɣeex-, (22) -deʔ, (23) -čʸiiʔ, (24) t'aʔ, (25) -ɣaʔ.

(26) -ciʔ, (27) -ǯiiɣ-, (28) -naʔ, (29) -n-čiⁿx, (30) -daʔ, (31) -ɣwoʔ, (32) -sastaan, (33) -čʸeʔx, (34) -keʔ, (35) -gwoʔł, (36) -laʔ, (37) -biʔł, (38) -k'os, (39) -c'ooʔ, (40) -ǯiiy-, (41) -naan, (42) -yaan, (43) -giš, (44) -ʔiŋ, (45) -c'aaʔ, (46) -gwoxw, (47) -diʔŋ, (48) -gee, (49) -bee, (50) -t'ah.

(51) -teen, (52) -daa, (53) -yiin, (54) -nii, (55) ǯiŋxaʔ, (56) gaaniŋxaʔ, (57) ciŋ', (58) -toʔ, (59) -deh, diⁿɣ, (60) cee, (61) łeeš, (62) -neʔ-, (63) ʔah, (64) łih, (65) koŋ', (66) dilbai, (67) -k'aŋ', (68) teeniŋ, (69) -čiiǯ, (70) -cow, (71) -cow, (72) -gai, (73) -xin, (74) ǯagwolxin, (75) -sel.

(76) -k'ac, (77) -biŋ, (78) -xiⁿʔ, (79) daakeh, (80) dinc'ʸeh, (81) ǯiŋ, (82) -toʔł, (83) -ciid-, (84) -lin, (85) -deh, diⁿɣ, (86) yaneʔ, (87) -ǯaad-, (88) -gaan-, (89) -daʔ-bagw, (90) —, (91) čiⁿʔx, (92) ƛ'oh, (93) -an-, (94) -taʔ, (95) -c'iŋ, (96) yas, (97) -ǯid, (98) -č'ah, (99) -ǯid, (100) ʔisdis.

9. The languages of the Apachean (or Southern Athapaskan) group are given as follows: Navaho, Chiricahua, San Carlos, (of the western division), Jicarilla, Lipan (of the eastern division). (Hoijer, 1938.) Only Mescalero, of the western division and mutually intelligible with Chiricahua, and Kiowa-Apache, of the eastern division, are lacking. In all of the forms cited below, high pitch is marked with an acute accent; unmarked syllables have low pitch.

NAVAHO. (1) ší, (2) ni, (3) nihí, (4) łáⁿ, (5) łaʔ, (6) naaki, (7) -co, (8) -neez, (9) -yáážˇ, (10) ʔasʒání, (11) diné, (12) łóóʔ, (13) łéécáⁿáⁿʔí, (14) yaaʔ, (15) cin, (16) -t'aⁿaⁿʔ, (17) -ciⁿʔ, (18) dił, (19) c'in, (20) -k'ah, (21) -ɣeⁿeⁿžii, (22) -deeʔ, (23) -ceeʔ, (24) -t'aʔ, (25) -ɣaaʔ.

(26) -ciiʔ, (27) -ǯaaʔ, (28) -nááʔ, (29) -í-číⁿiⁿh, (30) -zééʔ, (31) -ɣooʔ, (32) -cooʔ, (33) -s-gaan, (34) -keeʔ, (35) -god, (36) -í-laʔ, (37) -bid, (38) -k'os, (39) -beʔ, (40) -ǯéí, (41) -ƛáⁿ, (42) -yáⁿ, (43) -ɣáášˇ, (44) -ʔíⁿ, (45) -c'íⁿíⁿh, (46) -ɣošˇ, (47) -caah, (48) -ɣé, (49) -kóⁿóⁿh, (50) -t'ááh.

(51) -tíⁿ, (52) -dá, (53) -zíⁿ, (54) -ní, (55) ǯóhonaaʔáí, (56) ʔoolǯéé, (57) soⁿʔ, (58) tó, (59) -táⁿ, (60) cé, (61) sáí, (62) niʔ, (63) k'os, (64) łid, (65) koⁿʔ, (66) łeešˇ'iih, (67) -k'áⁿáⁿh, (68) ʔa-tiin, (69) -číí, (70) -ƛ'iž, (71) -co, (72) -gia, (73) -žin, (74) ƛ'éé, (75) -do.

(76) -k'az, (77) -bin, (78) -í-žiʔ, (79) tááʔ, (80) díⁿíⁿʔ, (81) ǯíⁿ, (82) ʔááh, (83) ńł-č'i, (84) -líⁿ, (85) -gis, (86) č'oš, (87) -ǯáád, (88) -gaan, (89) -daaʔ, (90) -č'íí, (91) šéé, (92) ƛ'oh, (93) -má, (94) -žéʔé, (95) tin, (96) yas, (97) -ʒid, (98) -čin, (99) -ʒid, (100) ƛ'óół.

CHIRICAHUA. (1) ší, (2) ⁿdí, (3) nahí, (4) łáⁿ, (5) łaʔ, (6) naaki, (7) -co, (8) -neez, (9) -záⁿáⁿyé, (10) ʔisʒáń, (11) nⁿdé, (12) łóíʔ, (13) kéǯaa, (14) yaa, (15) cin, (16) -t'aⁿaⁿ, (17) -ciⁿiⁿ, (18) dił, (19) -c'iⁿʔ, (20) k'ah, (21) -ɣeeže, (22) -deeʔ, (23) -ceeʔ, (24) -t'aʔ, (25) -ɣaa.

(26) -cii, (27) -ǯaa, (28) -ⁿdáa, (29) -í-číⁿ, (30) -zé, (31) -ɣoo, (32) -zaade, (33) -s-gan, (34) -kee, (35) -goʔ, (36) -laa, (37) -biʔ, (38) -k'os, (39) -beʔ, (40) -ǯéí, (41) -ƛáⁿ, (42) -yáⁿ, (43) -ɣáášˇ, (44) -ʔíⁿ, (45) -c'aʔ, (46) -ɣošˇ, (47) -caa, (48) -ɣé, (49) -koⁿoⁿ, (50) -t'á.

(51) -tíⁿ, (52) -dá, (53) -zíⁿ, (54) -ⁿdí,

(55) ǯíⁿgonaaʔáí, (56) ƛ'ééʔnaaʔáí, (57) soⁿoⁿs, (58) tó, (59) -táⁿ, (60) cé, (61) sáíʔ, (62) nii, (63) k'os, (64) łiʔ, (65) koⁿoⁿ, (66) goošč'ii, (67) -k'aⁿaⁿ, (68) ʔíń-tin, (69) -čí, (70) -ƛ'iž, (71) -coʔ, (72) -gaʔ, (73) -žiⁿʔ, (74) ƛ'é, (75) -doʔ.

(76) -k'az, (77) -biⁿʔ, (78) -í-žii, (79) tááʔ, (80) díⁿíⁿʔ, (81) ǯíⁿ, (82) ʔááʔ, (83) ńł-č'iʔ, (84) -líⁿ, (85) -gis, (86) č'oš, (87) -ǯáde, (88) -gan, (89) -daʔ, (90) -č'í, (91) -žé, (92) ƛ'oh, (93) -má, (94) -taa, (95) tiⁿʔ, (96) zas, (97) -ʒiʔ, (98) -čiⁿʔ, (99) -ʒiʔ, (100) ƛ'óół.

SAN CARLOS. (1) šíí, (2) ⁿdi, (3) nohʷíí, (4) łáⁿáⁿ, (5) łaʔ-, (6) naaki, (7) -co, (8) -neez, (9) -žaaž, (10) ʔisʒánhń, (11) nnéé, (12) łóg, (13) łíⁿíⁿčaayáné, (14) yaaʔ, (15) č'il, (16) -t'aⁿaⁿʔ, (17) -ciⁿʔ, (18) dił, (19) -c'in, (20) k'ah, (21) -yeⁿeⁿž, (22) -deeʔ, (23) ceeʔ, (24) -t'aʔ, (25) -ɣaa.

(26) -cii, (27) -ǯaa, (28) -náá, (29) -číⁿh, (30) -zéʔ, (31) -ɣooʔ, (32) -zaad, (33) -gan, (34) -keeʔ, (35) -god, (36) -laʔ, (37) -bid, (38) -k'os, (39) -beʔ, (40) -ǯíí, (41) -ƛáⁿ, (42) -yáⁿáⁿ, (43) -ɣááš, (44) -ʔíⁿíⁿ, (45) -c'ag, (46) -ɣoš, (47) -caa, (48) -ɣéé, (49) -koⁿoⁿ, (50) -t'áh.

(51) -tíⁿ, (52) -dáá, (53) -zíⁿ, (54) -nií, (55) yaaʔáí, (56) ƛ'ééʔgonaaʔáí, (57) c'iiłsoⁿ-oⁿsé, (58) tóó, (59) -táⁿáⁿ, (60) céé, (61) sáí, (62) niʔ, (63) yáák'os, (64) łid, (65) koⁿʔ, (66) ʔił-č'ii, (67) -k'áⁿáⁿ, (68) ʔi-tin, (69) -číí, (70) -ƛ'iž, (71) -cog, (72) -gai, (73) dił-xił, (74) ƛ'éʔ, (75) -dog.

(76) -k'az, (77) -biⁿh, (78) -íⁿíⁿ-žiʔ, (79) táági, (80) díⁿíⁿʔí, (81) ǯíⁿíⁿ, (82) ʔáád, (83) ʔiⁿiⁿł-č'iʔ, (84) -líⁿíⁿ, (85) -gis, (86) č'oš, (87) -ǯád, (88) -gan, (89) -zá-baané, (90) -č'iʔ, (91) -žíg, (92) ƛ'oh, (93) -máá, (94) -taa, (95) tiⁿh, (96) zas, (97) -ǯid, (98) -čáⁿáⁿ, (99) -ʒid, (100) ƛ'óół.

JICARILLA. (1) ší, (2) ni, (3) nahí, (4) łá, (5) łaʔ, (6) naaki, (7) -co, (8) -ⁿdees, (9) -žááh, (10) ʔisʒání, (11) diⁿdé, (12) łógee, (13) łíⁿʔčaaʔá, (14) yaaʔ, (15) nooščíí, (16) -t'aⁿaⁿʔ, (17) -ciⁿ, (18) dił, (19) -c'in, (20) xéh, (21) -ɣeeži, (22) -deeʔ, (23) -ceeʔ, (24) -t'aʔ, (25) -ɣaaʔ.

(26) -cii, (27) -ǯaa, (28) -ⁿdáá, (29) -číⁿš, (30) -zéʔ, (31) -ɣoo, (32) -zaadi, (33) -s-gan, (34) -kee, (35) -goʔ, (36) -laʔ, (37) -biʔ, (38) -k'os, (39) -beʔ, (40) -ǯéé, (41) -ƛáⁿʔ, (42) -yáⁿʔ, (43) -ɣáⁿš, (44) -ʔíⁿ, (45) -c'áⁿʔ, (46) -ɣoš, (47) -cei, (48) -ɣéh, (49) -kóⁿh, (50) -t'áíh.

(51) -kíⁿ, (52) -dá, (53) -zíⁿ, (54) -níh, (55) ǯíⁿgonaaʔáí, (56) ƛ'ééʔgonaaʔáí, (57) soⁿoⁿs, (58) kó, (59) -káⁿh, (60) cé, (61) sáí, (62) nii, (63) ńł-cáⁿ, (64) łiʔ, (65) koⁿʔ, (66) goščʼiíš, (67) -k'áⁿ, (68) ʔińkin, (69) -čííʔ, (70) -ƛ'iš, (71) -coʔ, (72) -gai, (73) -žiⁿ, (74) ƛ'éʔ, (75) -doʔ.

(76) -k'as, (77) -biⁿh, (78) -žiʔ, (79) kááʔ, (80) díⁿíⁿʔ, (81) ǯíⁿʔ, (82) naošigiži, (83) ńł-č'iʔ, (84) -líⁿʔ, (85) -dé, -deeʔ, (86) č'oš, (87) -ǯádí, (88) -gan, (89) -daa, (90) -č'éʔ, (91) -žégi, (92) ƛ'oh, (93) -má, (94) -kaʔé, (95) ʔíⁿ-loh, (96) zas, (97) -ʒiʔ, (98) -čáⁿʔ, (99) -ʒiʔ, (100) ƛ'ół.

LIPAN. (1) ší, (2) ⁿdí, (3) nahí, (4) łáⁿ, (5) łaʔ-, (6) naaki, (7) -co, (8) -ⁿdiis, (9) -záⁿáⁿyí, (10) ʔisʒání, (11) diⁿdí, (12) łóⁿʔ, (13) niiʔłíⁿ, (14) yɐɐ, (15) čiš, (16) -t'aⁿaⁿʔ, (17) -ciⁿiⁿ, (18) dił, (19) -c'iⁿh, (20) xáí, (21) -ɣaiš, (22) -diiʔ, (23) -ʒiscii ʔ, (24) -t'aʔ, (25) -ɣaa.

(26) -ciiʔ, (27) -ǯaa, (28) -ⁿdáa, (29) -í-číⁿš, (30) -zíʔ, (31) -ɣooʔ, (32) -zaadi, (33) -s-gaⁿaⁿ, (34) -kii, (35) -goh, (36) -laaʔ, (37) -bih, (38) -k'os, (39) -biʔ, (40) -ǯíí, (41) -ƛáⁿ, (42) -yáⁿ, (43) -ƛaⁿš, (44) -ʔíⁿ, (45) -c'ah, (46) -ɣoš, (47) -caa, (48) -ɣáí, (49) -koⁿoⁿ, (50) -t'áh.

(51) -kíⁿ, (52) -dá, (53) -zíⁿ, (54) -níh, (55) ǯíⁿíⁿʔnaaʔáí, (56) ƛ'éénaaʔáí, (57) soⁿoⁿs, (58) kó, (59) -kàⁿ, (60) cí, (61) sáí, (62) niiʔ, (63) k'os, (64) łih, (65) koⁿoⁿʔ, (66) gošc'iiš, (67) -k'áⁿ, (68) ʔiníkiⁿiⁿ, (69) -číš, (70) -ƛ'iš, (71) -co, (72) -gah, (73) -žiⁿh, (74) ƛ'íʔ, (75) -doh.

(76) -k'as, (77) -biⁿh, (78) -í-žiiʔ, (79) káíʔí, (80) díⁿíⁿʔí, (81) ǯíⁿ, (82) naašigiš, (83) ńłč'ih, (84) -líⁿ, (85) -dá, -daaʔ, (86) č'oš, (87) -ǯádí, (88) -gaⁿaⁿʔ, (89) -daa, (90) -č'íʔ, (91) -žáʔ-ƛ'išdi, (92) -ƛ'oh, (93)

-ʔ-nándí, (94) -ʔaaší, (95) kiⁿh, (96) zas, (97) -ʒih, (98) -čáⁿ, (99) -ʒih, (100) ɬ'óół.

10. A comparison of the five Apachean languages with each other yields the following results. Abbreviations: C = common percentage of test vocabulary; t = approximate number of years since divergence; Nav = Navaho; Chir = Chiricahua; SC = San Carlos; Jic = Jicarilla; Lip = Lipan. The non-cognate items (NC) are given by number.

Nav—Chir: C = 94/100 = 94%. t = 149. NC: 9, 13, 32, 56, 66, 94.

Nav—SC: C = 89/100 = 89%. t = 279. NC: 13, 15, 32, 55, 56, 57, 63, 66, 73, 89, 94.

Nav—Jic: C = 89/100 = 89%. t = 279. NC: 9, 15, 20, 32, 56, 63, 66, 82, 85, 94, 95.

Nav—Lip: C = 87/100 = 87%. t = 335. NC: 9, 13, 15, 20, 23, 32, 56, 66, 82, 85, 91, 93, 94.

SC—Chir: C = 91/100 = 91%. t = 227. NC: 9, 13, 15, 55, 57, 63, 66, 73, 89.

SC—Jic: C = 87/100 = 87%. t = 335. NC: 9, 13, 15, 20, 55, 57, 63, 66, 73, 82, 85, 89, 95.

SC—Lip: C = 84/100 = 84%. t = 419. NC: 9, 13, 15, 20, 23, 55, 57, 63, 66, 73, 82, 85, 89, 91, 93, 94.

Chir—Jic: C = 92/100 = 92%. t = 200. NC: 9, 13, 15, 20, 63, 82, 85, 95.

Chir—Lip: C = 91/100 = 91%. t = 227. NC: 13, 15, 20, 23, 82, 85, 91, 93, 94.

Jic—Lip: C = 91/100 = 91%. t = 227. NC: 9, 13, 15, 23, 63, 91, 93, 94, 95.

The times of divergence are tabulated (see Table I) for easy comparison. These figures emphasize the extremely close relationships of the Apachean languages; it would appear that the earliest divergence occurred only a little more than 400 years ago. The figures do not, however, reflect accurately the split between the western languages (Nav, Chir, SC) and the eastern (Jic, Lip) which is marked by the fact that Proto-Athapaskan *t (in stem syllables) becomes k in Jic and Lip but remains t in the rest (Hoijer, 1938). We find, for example, that SC and Jic are equally distant from Nav, and that Chir is about as close to Jic and Lip as it is to SC.

TABLE I. The Apachean Languages

	Nav	Chir	SC	Jic
Chir	149			
SC	279	227		
Jic	279	200	335	
Lip	335	227	419	227

These discrepancies may well result from the fact that all five languages have been in more or less close contact for the last two or three hundred years. The same factor may account in part for the generally low times of divergence.

TABLE II. Pacific Coast Languages

	Kato	Mattole
Mattole	858	
Hupa	963	963

11. Results for the three Pacific Coast languages (Kato, Mattole, and Hupa) are summarized below and in Table II.

Mattole—Kato: C = 65/93 = 70%. t = 858. NC: 10, 11, 13, 17, 20, 27, 32, 38, 46, 55, 56, 59, 61, 73, 74, 76, 78, 79, 80, 83, 85, 86, 87, 91, 93, 95, 98, 100.

Hupa—Kato: C = 63/94 = 67%. t = 963. NC: 10, 11, 20, 24, 26, 27, 30, 32, 38, 40, 43, 46, 47, 56, 59, 61, 67, 69, 76, 78, 80, 82, 83, 85, 87, 88, 90, 93, 95, 96, 100.

Hupa—Mattole: C = 66/99 = 67%. t = 963. NC: 10, 11, 13, 17, 20, 24, 26, 30, 40, 43, 46, 47, 55, 56, 59, 61, 66, 67, 69, 73, 74, 79, 82, 83, 86, 87, 88, 89, 91, 95, 96, 98, 100.

The languages of the Pacific Coast are obviously more remote from each other than are those of the Apachean group. Hupa, it is clear, stands separately as opposed to Mattole and Kato.

12. The northern languages and Galice (an Oregon language) are now compared

TABLE III. The Northern Languages and Galice

	Kut	Hare	Chip	Beav	Car	Sar
Hare	506					
Chip	628	660				
Beav	755	628	477			
Car	858	858	628	755		
Sar	1036	928	660	597	823	
Gal	1036	963	724	628	823	858

(see also Table III). It should be emphasized, however, that there is no linguistic data in support of a single northern substock. Indeed, the few data available suggest quite the contrary: that each of the languages treated belongs to a separate sub-stock. Galice is treated here simply for convenience; it might have been listed with the Pacific languages. Abbreviations: Beav = Beaver, Car = Carrier, Chip = Chipewyan, Gal = Galice, Kut = Kutchin, Sar = Sarcee.

Kut—Hare: C = 81/100 = 81%. t = 506. NC: 10, 18, 19, 20, 21, 29, 30, 32, 33, 41, 42, 43, 45, 46, 51, 73, 75, 85, 89.

Kut—Chip: C = 77/100 = 77%. t = 628. NC: 9, 10, 18, 20, 21, 33, 35, 39, 41, 42, 43, 46, 48, 51, 53, 69, 70, 75, 82, 85, 89, 93, 100.

Kut—Beav: C = 60/82 = 73%. t = 755. NC: 6, 10, 18, 20, 27, 29, 30, 33, 41, 42, 43, 47, 51, 53, 66, 72, 74, 75, 78, 89, 93, 100. (The brevity of the test list available in Beaver casts some doubt on the reliability of the comparisons involving this language.)

Kut—Car: C = 70/100 = 70%. t = 858. NC: 3, 9, 10, 18, 20, 21, 32, 39, 41, 43, 46, 47, 51, 53, 62, 66, 69, 70, 72, 73, 74, 75, 77, 85, 87, 89, 91, 93, 94, 100.

Kut—Sar: C = 64/99 = 65%. t = 1036. NC: 5, 6, 9, 10, 17, 18, 20, 21, 30, 33, 39, 41, 42, 43, 46, 47, 51, 53, 55, 56, 61, 66, 69, 70, 74, 75, 77, 85, 86, 87, 89, 90, 92, 93, 100.

Kut—Gal: C = 58/89 = 65%. t = 1036. NC: 6, 9, 10, 18, 20, 21, 30, 33, 39, 41, 42, 43, 46, 47, 49, 51, 53, 56, 57, 59, 61, 62, 63, 66, 74, 75, 77, 87, 93, 97, 100. (The Galice list, like that for Beaver, is perhaps too brief to yield accurate results.)

Hare—Chip: C = 76/100 = 76%. t = 660. NC: 9, 10, 19, 20, 29, 30, 32, 35, 39, 42, 43, 45, 46, 48, 53, 69, 70, 73, 75, 82, 85, 89, 93, 100.

Hare—Beav: C = 63/82 = 77%. t = 628. NC: 6, 10, 19, 20, 27, 32, 42, 43, 45, 47, 53, 66, 72, 73, 74, 78, 89, 93, 100.

Hare—Car: C = 70/100 = 70%. t = 858. NC: 3, 9, 10, 19, 29, 30, 32, 33, 39, 42, 43, 45, 47, 53, 62, 66, 69, 70, 72, 73, 74, 75, 77, 85, 87, 89, 91, 93, 94, 100.

Hare—Sar: C = 67/99 = 68%. t = 928. NC: 5, 6, 9, 10, 17, 19, 29, 32, 39, 42, 43, 45, 47, 53, 55, 56, 61, 66, 69, 70, 73, 74, 75, 77, 85, 86, 87, 89, 90, 92, 93, 100.

Hare—Gal: C = 60/89 = 67%. t = 963. NC: 6, 9, 10, 19, 20, 21, 29, 30, 39, 43, 45, 46, 47, 49, 53, 56, 57, 59, 61, 62, 63, 66, 68, 74, 77, 87, 93, 97, 100.

Chip—Beav: C = 67/82 = 62%. t = 477. NC: 6, 27, 29, 30, 42, 43, 47, 48, 66, 72, 74, 75, 78, 89, 93. (The t for this comparison seems too small: this may be a consequence of the brevity of the test list.)

Chip—Car: C = 77/100 = 77%. t = 628. NC: 3, 20, 32, 33, 35, 42, 46, 47, 48, 62, 66, 69, 70, 72, 73, 74, 75, 77, 82, 87, 91, 93, 94.

Chip—Sar: C = 75/99 = 76%. t = 660. NC: 5, 6, 9, 17, 20, 30, 35, 42, 46, 47, 48, 55, 56, 61, 66, 70, 74, 75, 77, 85, 86, 87, 90, 92.

Chip—Gal: C = 66/89 = 74%. t = 724. NC: 6, 9, 20, 30, 35, 42, 43, 47, 48, 49, 56, 57, 59, 61, 62, 63, 66, 68, 74, 75, 77, 87, 97.

Beav—Car: C = 60/82 = 73%. t = 755. NC: 3, 6, 20, 27, 29, 30, 32, 33, 42, 43, 47, 62, 66, 72, 73, 74, 75, 78, 87, 89, 93, 94.

Beav—Sar: C = 64/82 = 78%. t = 597. NC: 5, 17, 20, 27, 29, 43, 47, 55, 56, 66, 72, 74, 75, 78, 87, 89, 92, 93.

Beav—Gal: C = 61/79 = 77%. t = 628. NC: 6, 20, 27, 29, 30, 43, 49, 56, 57, 59, 62, 63, 66, 68, 72, 78, 87, 93.

Car—Sar: C = 71/99 = 71%. t = 823. NC: 3, 5, 6, 9, 17, 30, 32, 33, 42, 55, 56, 61, 62, 66, 69, 70, 72, 73, 75, 77, 85, 86, 87, 90, 91, 92, 93, 94.

Car—Gal: C = 63/89 = 71%. t = 823. NC: 3, 6, 9, 20, 30, 33, 42, 43, 46, 47, 49,

56, 57, 59, 61, 62, 63, 66, 68, 72, 74, 75, 87, 93, 94, 97.

Sar—Gal: C = 62/89 = 70%. t = 858. NC: 5, 6, 9, 17, 20, 30, 42, 43, 46, 47, 49, 55, 56, 57, 59, 61, 62, 63, 66, 68, 74, 75, 77, 87, 90, 92, 97.

Table III presents these times of divergence in more convenient form. A fair correlation may be seen between time of divergence (t) and the distance separating languages; t increases with distance. Three sets of languages, each including two languages spoken in contiguous areas, show t's of less than 600 years: Beaver—Chipewyan (477), Kutchin—Hare (506), and Sarcee—Beaver (597).

In the next seven sets, the languages in each set are spoken at a greater distance and not in contiguous areas; here the t's fall between 628 and 724: Chipewyan—Kutchin (628), Beaver—Hare (628), Carrier—Chipewyan (628), Galice—Beaver (628), Chipewyan—Hare (660), Sarcee—Chipewyan (660), and Galice—Chipewyan (724).

In the third group, the language pairs have t's between 755 and 858, and the languages of each pair—with two exceptions—are again spoken at some distance from each other: Beaver—Kutchin (755), Galice—Carrier (823), Carrier—Kutchin (858), Carrier—Hare (858), and Galice—Sarcee (858). The languages of the exceptional pairs—Carrier—Beaver (755) and Carrier—Sarcee (823)—although spoken at no great distance from each other, are in each case separated by a mountain barrier.

Our last group, those pairs with t's between 928 and 1036, include in each case, languages spoken at the greatest distance from each other. These are: Sarcee—Hare (928), Galice—Hare (963), Sarcee—Kutchin (1036), and Galice—Kutchin (1036).

13. The paragraphs that follow show the time of divergence between each of the Apachean languages and those of the northern and Pacific Coast areas.

Nav—Chip: C = 77/100 = 77%. t = 628. NC: 10, 13, 20, 35, 39, 41, 42, 46, 47, 48, 49, 55, 56, 59, 66, 69, 74, 77, 82, 85, 86, 93, 94.

Nav—Beav: C = 62/82 = 76%. t = 660. NC: 6, 10, 13, 20, 27, 29, 30, 41, 43, 47, 49, 55, 56, 59, 66, 72, 75, 78, 89, 94.

Nav—Gal: C = 64/89 = 72%. t = 790. NC: 6, 9, 10, 13, 30, 39, 41, 43, 46, 47, 49, 55, 56, 57, 59, 61, 62, 63, 66, 68, 75, 87, 93, 94, 97.

Nav—Car: C = 72/100 = 72%. t = 790. NC: 3, 10, 13, 20, 32, 33, 39, 41, 42, 46, 49, 55, 56, 59, 62, 66, 69, 70, 72, 73, 74, 75, 85, 86, 87, 91, 93, 94.

Nav—Hare: C = 69/100 = 69%. t = 892. NC: 9, 10, 13, 19, 20, 29, 30, 32, 39, 41, 43, 45, 46, 47, 49, 53, 55, 56, 59, 66, 70, 73, 74, 75, 77, 85, 86, 89, 93, 94, 100.

Nav—Kut: C = 70/100 = 70%. t = 858. NC: 9, 10, 13, 18, 20, 21, 33, 39, 41, 42, 43, 46, 47, 49, 51, 53, 55, 56, 59, 66, 70, 74, 75, 77, 85, 86, 89, 93, 94, 100.

Nav—Sar: C = 67/99 = 68%. t = 928. NC: 5, 6, 9, 10, 13, 17, 20, 30, 39, 41, 42, 46, 49, 55, 56, 59, 61, 63, 66, 69, 70, 74, 75, 77, 85, 86, 87, 90, 92, 93, 94, 95.

Nav—Kato: C = 64/94 = 68%. t = 928. NC: 10, 11, 13, 18, 27, 30, 38, 41, 43, 46, 47, 49, 55, 56, 59, 63, 70, 75, 76, 78, 80, 82, 83, 85, 86, 87, 90, 93, 94, 100.

Nav—Mattole: C = 63/99 = 65%. t = 1036. NC: 10, 11, 13, 17, 18, 20, 30, 32, 33, 39, 41, 43, 47, 49, 55, 56, 59, 61, 63, 66, 70, 73, 74, 75, 79, 82, 83, 85, 86, 89, 91, 93, 94, 95, 98, 100.

Nav—Hupa: C = 64/100 = 64%. t = 1073. NC: 10, 11, 13, 18, 20, 24, 26, 30, 32, 33, 39, 40, 41, 46, 47, 49, 55, 56, 59, 61, 63, 66, 67, 69, 70, 75, 82, 83, 85, 86, 87, 88, 93, 94, 95, 96.

Chir—Chip: C = 76/100 = 76%. t = 660. NC: Add 9, 32 to Nav—Chip list; omit 94.

Chir—Beav: C = 62/82 = 76%. t = 660. NC: Add 32, omit 94 in Nav—Beav list.

Chir—Gal: C = 65/89 = 73%. t = 755. NC: Omit 94 from Nav—Gal list.

Chir—Car: C = 71/100 = 71%. t = 823. NC: Add 9 to Nav—Car list.

Chir—Hare: C = 72/100 = 72%. t = 790. NC: Omit 9, 32, 94 from Nav—Hare list.

Chir—Kut: C = 71/100 = 71%. t = 823. NC: Add 32 and omit 9, 94 from Nav—Kut list.

Chir—Sar: C = 67/99 = 68%. t = 928. NC: Add 32 and omit 94 from Nav—Sar list.

Chir—Kato: C = 63/94 = 67%. t = 963. NC: Add 9, 32, and omit 94 from Nav—Kato list.

Chir—Mattole: C = 64/99 = 65%. t = 1036. NC: Add 9 and omit 94, 98 from Nav—Mattole list.

Chir—Hupa: C = 64/100 = 64%. t = 1073. NC: Add 9 and omit 94 from Nav—Hupa list.

SC—Chip: C = 72/100 = 72%. t = 790. NC: Add 15, 32, 57, 63, 73, 89 to Nav—Chip list; omit 94.

SC—Beav: C = 58/82 = 71%. t = 823. NC: Add 15, 32, 57, 63, 73 to Nav—Beav list; omit 94.

SC—Gal: C = 64/89 = 72%. t = 790. NC: Add 15 and omit 94 from Nav—Gal list.

SC—Car: C = 68/100 = 68%. t = 928. NC: Add 15, 57, 63, 89 to Nav—Car list.

SC—Hare: C = 68/100 = 68%. t = 928. NC: Add 15, 57, 63 to Nav—Hare list; omit 32, 94.

SC—Kut: C = 66/100 = 66%. t = 1000. NC: Add 15, 32, 57, 63, 73 to Nav—Kut list; omit 94.

SC—Sar: C = 64/99 = 65%. t = 1036. NC: Add 15, 32, 57, 89 to Nav—Sar list; omit 94.

SC—Kato: C = 62/94 = 66%. t = 1000. NC: Add 15, 32, 57, 73 to Nav—Kato list; omit 76, 94.

SC—Mattole: C = 62/99 = 63%. t = 1112. NC: Add 15, 57 to Nav—Mattole list; omit 94.

SC—Hupa: C = 61/100 = 61%. t = 1189. NC: Add 15, 57, 73, 89 to Nav—Hupa list; omit 94.

Jic—Chip: C = 74/100 = 74%. t = 724. NC: Add 9, 15, 32, 63, 95 to Nav—Chip list; omit 85, 94.

Jic—Beav: C = 59/82 = 72%. t = 790. NC: Add 15, 32, 63, 95 to Nav—Beav list; omit 94.

Jic—Gal: C = 62/89 = 70%. t = 858. NC: Add 15, 20, 95 to Nav—Gal list; omit 94.

Jic—Car: C = 69/100 = 69%. t = 892. NC: Add 9, 15, 63, 82, 95 to Nav—Car list; omit 20, 85.

Jic—Hare: C = 68/100 = 68%. t = 928. NC: Add 15, 63, 82, 95 to Nav—Hare list; omit 20, 32, 94.

Jic—Kut: C = 67/100 = 67%. t = 963. NC: Add 15, 32, 63, 82, 95 to Nav—Kut list; omit 51, 94.

Jic—Sar: C = 67/99 = 68%. t = 928. NC: Add 15, 32 to Nav—Sar list; omit 20, 94.

Jic—Kato: C = 61/94 = 65%. t = 1036. NC: Add 9, 15, 20, 32, 95, to Nav—Kato list; omit 85, 94.

Jic—Mattole: C = 63/99 = 65%. t = 1036. NC: Add 9, 15 to Nav—Mattole list; omit 20, 94.

Jic—Hupa: C = 63/100 = 63%. t = 1112. NC: Add 9, 15 to Nav—Hupa list; omit 94.

Lip—Chip: C = 74/100 = 74%. t = 724. NC: Add 9, 15, 23, 32, 91, to Nav—Chip list; omit 85, 93.

Lip—Beav: C = 58/82 = 71%. t = 823. NC: Add 15, 23, 32, 93 to Nav—Beav list.

Lip—Gal: C = 62/89 = 69%. t = 892. NC: Add 15, 20, 23, to Nav—Gal list; omit 93.

Lip—Car: C = 70/100 = 70%. t = 858. NC: Add 9, 15, 23, 82 to Nav—Car list; omit 20, 85.

Lip—Hare: C = 68/100 = 68%. t = 928. NC: Add 15, 23, 82, 91 to Nav—Hare list; omit 9, 20, 32.

Lip—Kut: C = 66/100 = 66%. t = 1000. NC: Add 15, 23, 32, 82, 91 to Nav—Kut list; omit 9.

Lip—Sar: C = 65/99 = 66%. t = 1000.

TABLE IV. Apachean and the Northern and Pacific Coast Languages

	Nav	Chir	SC	Jic	Lip
Chip	628	660	790	724	724
Beav	660	660	823	790	823
Gal	790	755	790	858	892
Car	790	823	928	892	858
Hare	892	790	928	928	928
Kut	858	823	1000	963	1000
Sar	928	928	1036	928	1000
Kato	928	963	1000	1036	1073
Mattole	1036	1036	1112	1036	1150
Hupa	1073	1073	1189	1112	1229

NC: Add 15, 23, 32, 91 to Nav—Sar list; omit 20, 93.

Lip—Kato: C = 60/94 = 64%. t = 1073. NC: Add 9, 15, 20, 23, 32, 91 to Nav—Kato list; omit 85, 93.

Lip—Mattole: C = 61/99 = 62%. t = 1150. NC: Add 9, 15, 23 to Nav—Mattole list; omit 20.

Lip—Hupa: C = 60/100 = 60%. t = 1229. NC: Add 9, 15, 23, 91 to Nav—Hupa list.

The results of these determinations are summarized in Table IV. It will be noted that, with few exceptions, the Apachean languages are farther distant from those of the Pacific Coast than any are from the northern languages. Note, too, that there is no great difference between the Apachean languages insofar as concerns the times of divergence between them and the northern or Pacific Coast idioms. This suggests, as indeed does also the close relationship of the Apachean languages (see Table I), that the Apachean peoples moved off from the north as a unit and independently of the Pacific Coast groups.

14. The Pacific Coast languages reveal the following times of divergence from the languages of the north.

Kato—Gal: C = 62/84 = 74%. t = 724. NC: 9, 10, 11, 18, 27, 38, 43, 47, 49, 56, 57, 59, 61, 62, 68, 76, 78, 80, 83, 87, 90, 100.

Kato—Beav: C = 58/78 = 74%. t = 724. NC: 6, 11, 18, 20, 27, 29, 30, 38, 43, 47, 56, 59, 63, 72, 76, 80, 83, 87, 93, 100.

Kato—Chip: C = 67/94 = 71%. t = 823. NC: 11, 18, 20, 27, 30, 35, 38, 42, 43, 47, 48, 56, 59, 63, 69, 70, 74, 75, 76, 77, 78, 80, 82, 83, 89, 90, 100.

Kato—Car: C = 61/94 = 65%. t = 1036. NC: 3, 11, 18, 20, 27, 30, 32, 38, 42, 43, 46, 47, 56, 59, 62, 63, 69, 70, 72, 73, 74, 75, 76, 78, 80, 82, 83, 87, 90, 91, 93, 94, 100.

Kato—Hare: C = 61/94 = 65%. t = 1036. NC: 9, 10, 11, 18, 19, 20, 27, 29, 30, 32, 38, 43, 45, 46, 47, 53, 56, 59, 63, 70, 73, 74, 76, 77, 78, 80, 82, 83, 85, 87, 90, 93, 100.

Kato—Sar: C = 60/93 = 64%. t = 1073. NC: 5, 6, 9, 11, 17, 18, 20, 27, 30, 38, 42, 43, 46, 47, 55, 56, 59, 61, 63, 69, 70, 74, 75, 76, 77, 78, 80, 83, 85, 86, 90, 92, 100.

Kato—Kut: C = 61/94 = 65%. t = 1036. NC: 9, 10, 11, 18, 20, 21, 27, 30, 38, 41, 42, 43, 46, 47, 51, 53, 56, 59, 63, 70, 74, 75, 76, 77, 78, 80, 82, 83, 85, 87, 90, 93, 100.

Hupa—Gal: C = 62/89 = 70%. t = 858. NC: 6, 9, 10, 11, 18, 20, 24, 26, 30, 33, 40, 43, 46, 49, 56, 57, 61, 62, 66, 67, 68, 83, 88, 93, 95, 96, 97.

Hupa—Beav: C = 56/82 = 68%. t = 928. NC: 6, 10, 11, 18, 20, 24, 26, 27, 29, 32, 33, 40, 43, 59, 63, 66, 67, 72, 78, 83, 87, 88, 89, 93, 95, 96.

Hupa—Chip: C = 67/100 = 67%. t = 963. NC: 10, 11, 18, 20, 24, 26, 30, 32, 33, 35, 40, 42, 46, 47, 48, 59, 61, 63, 66, 67, 69, 70, 74, 75, 77, 82, 83, 85, 87, 88, 93, 95, 96.

Hupa—Car: C = 65/100 = 65%. t = 1036. NC: 3, 10, 11, 18, 20, 24, 26, 30, 32, 33, 40, 42, 46, 47, 59, 61, 62, 63, 66, 67, 69, 70, 72, 73, 74, 75, 82, 83, 87, 88, 91, 93, 94, 95, 96.

Hupa—Hare: C = 61/100 = 61%. t = 1189. NC: 9, 10, 11, 18, 19, 20, 24, 26, 29, 32, 33, 39, 40, 41, 43, 45, 46, 47, 53, 59, 61, 63, 66, 67, 69, 70, 73, 74, 77, 82, 83, 85, 87, 88, 89, 93, 95, 96, 100.

Hupa—Sar: C = 61/99 = 62%. t = 1150. NC: 5, 6, 9, 10, 11, 17, 18, 20, 24, 26, 32, 33, 40, 42, 46, 47, 55, 56, 59, 61, 63, 66, 67,

69, 70, 74, 75, 77, 83, 85, 86, 87, 88, 90, 92, 93, 95, 96.

Hupa—Kut: C = 60/100 = 60%. t = 1229. NC: 9, 10, 11, 18, 20, 21, 24, 26, 30, 32, 33, 39, 40, 41, 42, 43, 46, 47, 51, 53, 59, 61, 63, 66, 67, 69, 70, 74, 75, 77, 82, 83, 85, 87, 88, 89, 93, 95, 96, 100.

Mattole—Gal: C = 58/88 = 66%. t = 1000. NC: 6, 9, 10, 11, 13, 17, 18, 20, 33, 43, 46, 47, 49, 55, 56, 57, 59, 61, 62, 66, 68, 74, 79, 83, 87, 93, 95, 97, 98, 100.

Mattole—Beav: C = 62/82 = 63%. t = 1112. NC: 6, 10, 11, 13, 17, 18, 20, 27, 29, 30, 32, 33, 43, 47, 55, 56, 59, 63, 66, 72, 73, 74, 78, 79, 83, 89, 93, 95, 98, 100.

Mattole—Chip: C = 61/99 = 62%. t = 1150. NC: 10, 11, 13, 17, 18, 20, 30, 32, 33, 35, 42, 43, 46, 47, 48, 55, 56, 59, 61, 63, 66, 69, 70, 73, 74, 75, 77, 79, 82, 83, 85, 86, 89, 91, 93, 95, 98, 100.

Mattole—Car: C = 61/99 = 62%. t = 1150. NC: 3, 10, 11, 13, 17, 18, 30, 32, 33, 42, 43, 46, 47, 55, 56, 59, 61, 62, 63, 66, 69, 70, 72, 73, 74, 75, 79, 82, 83, 86, 87, 89, 91, 93, 94, 95, 98, 100.

Mattole—Hare: C = 61/99 = 62%. t = 1150. NC: 9, 10, 11, 13, 17, 18, 19, 29, 30, 32, 33, 39, 43, 45, 46, 47, 53, 55, 56, 59, 61, 63, 66, 70, 73, 74, 77, 79, 82, 83, 85, 86, 89, 91, 93, 95, 98, 100.

Mattole—Sar: C = 60/98 = 61%. t = 1189. NC: 5, 6, 9, 10, 11, 13, 17, 18, 30, 32, 33, 42, 46, 47, 55, 56, 59, 61, 63, 66, 69, 70, 73, 74, 75, 77, 79, 83, 85, 86, 87, 89, 91, 92, 93, 95, 98, 100.

Mattole—Kut: C = 58/99 = 58%. t = 1311. NC: 9, 10, 11, 13, 17, 18, 20, 21, 30, 32, 33, 39, 41, 42, 43, 46, 47, 51, 53, 55, 56, 59, 61, 63, 66, 70, 73, 74, 75, 77, 79, 82, 83, 85, 86, 89, 91, 93, 95, 98, 100.

The divergence times for the Pacific Coast and Northern languages are summarized in Table V. The general trend here, as in the case of the Northern languages alone (see Table III) is for t to increase with distance. Note, too, that Mattole appears to have diverged earlier than Hupa and Kato.

TABLE V. The Pacific Coast and the Northern Languages

	Kato	Hupo	Mattole
Galice	724	858	1000
Beaver	724	928	1112
Chipewyan	823	963	1150
Carrier	1036	1036	1150
Hare	1036	1189	1150
Sarcee	1073	1150	1189
Kutchin	1036	1229	1311

TABLE VI

Dates	Pacific Coast/ Northern	Pacific Coast/ Apachean	Apachean/ Northern
1400			
1300	1		
1200	1	1	
1100	7	4	
1000	6	7	4
900	2	2	8
800	2		10
700	2		9
600			4

15. The data in Tables IV and V are combined in Table VI. In the first (Dates) column I give a sequence of 100 year intervals from 1400 (years ago) to 600. The second column indicates, for each date interval, the number of divergences of Pacific Coast and Northern languages. The same is done in the third and fourth columns, respectively, for divergences of Pacific Coast and Apachean languages and for divergences of Apachean and Northern languages.

Table VI reveals clearly that the Pacific Coast languages broke off from the common Athapaskan body some time before the proto-Apachean groups began their move to the south. A majority (13 out of 21) Pacific Coast—Northern divergences occur between 1000 and 1200 years ago, while the bulk of the Apachean—Northern divergences (27 out of 35) took place between 700 and 1000 years ago. Note, too, that all the Pacific Coast—Apachean divergences occurred in the same time period that witnessed the

divergence of the Pacific Coast and Northern languages.

It is somewhat surprising to find how little time is involved in the break-up of the Athapaskan languages—the earliest time of divergence is only about 1300 years ago. The movement of the Pacific Coast languages to the south apparently begins almost at once and is essentially complete at a date roughly 1000 years ago. The movement of the Apachean languages southward appears to have begun somewhat later, about 1000 years ago and, if our dating is accurate, was not entirely complete until about 600 years ago. This seems to indicate that the residence of the Apachean speaking peoples in the Southwest is not of any great duration, although it is difficult to estimate the time it may have taken for these peoples to move the distance involved.

16. Goddard, P. E. 1912, Elements of the Kato Language, UCPAAE 11.1–176; 1916, Beaver Dialect, AP-AMNH 10.399–546.

Herzog, George and others. 1934, Some Orthographic Recommendations, AA 36.629.

Hoijer, Harry. 1938, The Southern Athapaskan Languages, AA 40.75–87; 1956, Lexicostatistics: A Critique, Lg. 32.49–60.

Lees, Robert B. 1953, The Basis of Glottochronology, Lg. 29.113–127.

LeGoff, L. 1916, Dictionnaire Français-Montagnais, Paris.

Li, Fang-Kuei. 1930, Mattole, An Athapaskan Language, Chicago; 1933a, A List of Chipewyan Stems, IJAL 7.122–151; 1933b, Chipewyan Consonants, The Ts'ai Yuan P'ei Anniv. Vol. (Supplementary Vol. I, Bull. of the Inst. of History and Philology of the Academia Sinica), Peiping. pp. 429–467.

Morice, A. G. 1932, The Carrier Language, St. Gabriel-Mödling, Austria and Winnepeg, Manitoba, Canada. 2 vols.

Petitot, Le R. P. E. 1876, Dictionnaire de la Langue Dènè- Dindjié, Paris.

Sapir, Edward. 1914, Notes on Chasta Costa Phonology and Morphology, Anthro. Pubs., Univ. of Pennsylvania Museum, vol. 2, no. 2; 1925, Pitch Accent in Sarcee, an Athapaskan Language, JSAP 17.185–205.

Swadesh, Morris. 1952, Lexico-Statistic Dating of Prehistoric Ethnic Contacts, APS-P 96.452–463; 1955, Towards Greater Accuracy in Lexicostatistic Dating, IJAL 21.121–137.

THE PHONEMES OF NORTHEASTERN MAIDU

WILLIAM SHIPLEY

BERKELEY, CALIFORNIA

0. Introduction
1. Analysis of deliberate speech
1.1. Chart of the segmental phonemes
1.2. Consonantal phonemes
1.3. Vocalic phonemes
2. Allegro speech
3. Vowel harmony.

0.1. Northeastern Maidu is a Penutian language spoken in the Sierra of Northern California. The phonemic analysis presented here is based on notes taken in the field during the summer of 1955, with Mrs. Lee Gallagher of Paynes Creek, California as principal informant. The fieldwork was done under the auspices of the Survey of California Indian Languages, Department of Linguistics, the University of California at Berkeley.

NE Maidu is a lenis language. Its speakers consistently characterize lenis speech as being "the nice way to talk" even though it is always possible to elicit strongly articulated utterances from them. Coupled with lenis articulation are certain phonological phenomena which are discussed in **2** below.

The suprasegmental phonemes will not be systematically described in the present paper. It is necessary, however, to describe the stress phenomena as a preliminary to the elucidation of certain segmental variants, notably in the vowel phonemes. All roots have at least one allomorph which occurs with primary stress. If the root is disyllabic, the primary stress is on the first syllable in some words, the second syllable in others. In compound words (i.e., in words which are made up of more than one root) one of the roots has primary stress while the others have a secondary stress. The primary stress may appear on the first member of the compound in one instance, on the second in another, and so on. In short, stress is phonemic.

The primary stress is characterized by: (a) relatively fortis enunciation; (b) a pitch about one tone higher than the pitches of the adjacent syllables; (c) about two morae of length in the stressed vowel, if the syllable is open.

The secondary stress is characterized by: (a) relatively fortis enunciation; (b) about two morae of length in the stressed vowel, if the syllable is open.

There is no difference in pitch between syllables with secondary stress and syllables without stress. Vowels in closed syllables are never more than one mora in length, no matter what the nature of the stress may be.

0.2. The vocalic and nasal consonantal phonemes of NE Maidu have certain allophones which may be described as essentially sliding or variable in quality. This variability is free. The allophones must not, however, be thought of as free variants in the usual sense, i.e., as more or less defined discrete phonetic entities. Such sliding allophones in Maidu always have a focus or STATION which may be said to represent the cluster of overt phonetic expressions with the highest frequency of occurrence for the total allophone. In Maidu, this station is never in the center of the allophonic continuum but always at one end. Thus, a given sliding allophone [X] might be described as: $[X] = [X_1 \ldots .]$ where X_1 is the station and the points represent other possible manifestations of the allophone (of less frequent occurrence). The description of a given sliding allophone must include, for Maidu not only the phonetic quality of its station but also of its LIMIT, i.e., the phonetic quality of the point farthest from the sta-

tion. If this quality be represented by X_2 then: $[X] = [X_1 \ldots X_2]$, or $[X] = [X_1 > X_2]$ with the station indicated to the left of > and the limit to the right. Thus the > points from the station to the limits.

A specific example of a sliding allophone may be taken from among the allophones of /i/ (**1.3**):

In the environment C–Csyl,

$$X_1 = [\text{ɪ}]$$
$$X_2 = [\text{i}^{\text{ʏ}}]$$
$$\therefore [X_1 > X_2] = [\text{ɪ} > \text{i}^{\text{ʏ}}]$$

0.3. The two canonical forms for the NE Maidu syllable are CV and CVC.

No exceptions to these two canons have been discovered to date. No consonant which involves glottal articulation ever occurs in syllable-final position (**1.1**). The roots of the language are probably all monosyllabic or disyllabic, although this cannot be established with certainty until the morphological analysis is complete. Roots of the following types have been found: CV bó *trail*; CVC lýk *crawl*; CVCV kojó *field*; CVCCV kákka *crow*; CVCVC jamán *mountain*.

1.1. The NE Maidu phonemes may be charted as follows:

Consonants (18):

Occur syllable-initially only:

b	ṕ
d	ṫ
	ć
	ḱ
ʔ	

Occur syllable-initially and syllable-finally:

	p	m	w
s	t	n	l
	c	j	
h	k		

Vowels (6):

i	y	u
e		o
	a	

1.2. The voiced implosive stops are produced by the release of a previously formed partial vacuum between the point of articulation and the glottis. There are two stops in this series: /b/ bilabial, e.g., bóm *trail*; /d/ blade alveolar, e.g., dó *bite*. The only perceptible variants of these phonemes are those heard in allegro speech, when the implosion becomes more lenis. An excellent description of the phonetic quality of these implosives is to be found in Uldall's paper on the phonetics of Nisenan.[1] /b/ and /d/ are limited in occurrence to syllable-initial position, as are all the consonantal phonemes of NE Maidu which are in any way involved with glottal articulation.

The voiceless stops are unaspirated when followed by another consonant; otherwise they are moderately aspirated. They are:

/p/bilabial, before C: màmćípbym *finger*; elsewhere: pénem *two*.

/t/ apical alveolar, before C: hýtpem *fat*; elsewhere: tetét *very*.

/c/ palatal, comparable to English [č] but not affricated, before C: ʔàkícʔanàm *raccoon*; elsewhere: cikínim *chicken*.

/k/ velar, fronted before /i/ and /e/, midvelar before /a/ and /y/ and backed before /u/ and /o/, before C: láklàkpem *red*; elsewhere: kówkòwpem *gray*.

The glottalized stops and glottal stop are limited in distribution to syllable-initial position; they are pronounced with more fortis articulation word-initially than elsewhere. /ḱ/ is not conditioned by the following vowel but is always fairly backed due, no doubt, to the simultaneous glottalization. It therefore differs in this respect from /k/, i.e., with regard to the nature of its allophones. The stops of this series are: /ṕ/ bilabial glottalized, e.g., ṕýbe *boy*; /ṫ/ apical alveolar glottalized, e.g., ṫéspem *short*; /ć/ palatal glottalized, e.g., ćám *tree*; /ḱ/ velar glottalized, e.g., ḱàwím *land*; /ʔ/ glottal, e.g., petápyʔỳ *let's us two eat*.

[1] Uldall, H. J., Maidu Phonetics, IJAL 20.8 (1954).

There are two spirants in NE Maidu both voiceless. They are /s/ and /h/. /h/ has no perceptible variants, and occurs only in syllable-initial position. /s/, which occurs both syllable-initially and syllable-finally, has the following variants:

Initially, rather fortis and somewhat backed, but not retroflexed, e.g., sýttim *one*.

Finally or before an aspirated stop, very short and lenis, e.g., pe?ás *I ate*.

Before a glottalized stop, somewhat longer and moderately fortis, e.g., jáskaknom *a skinny man*.

Before all other consonants, moderately fortis and perceptibly shorter than before the glottalized stops, e.g., wíslam *chipmunk*.

The nasals, /m/ and /n/, exhibit a frequently occurring free variant of voicelessness in phrase or sentence final position. The oldest speakers of NE Maidu pronounce voiceless nasals in final position much more frequently than the younger ones.

/m/ bilabial voiced has the following other variants:

Before /k/, /k̓/ or /w/, a velar nasal [ŋ] occurs. In some instances, viz., when one of the junctures intervenes, an [m] occurs in extremely precise and careful speech. E.g., pedóm ka?àmkano *you are eating* (i.e., /pedó[ŋ] ka?à[ŋ]kano/, but sometimes /pedó[m] ka?à[ŋ]kano/).

Before other consonants, a lenis bilabial nasal occurs, e.g., mómdi *in the water*.

Elsewhere, a moderately fortis voiced bilabial nasal occurs, e.g., mòmím *water*.

There are two semivowels:

/w/ is a bilabial semivowel with the quality of nonsyllabic [u] before or after /i/ or /y/ and before /u/, but somewhat lowered in quality before or after /e/, /a/ or /o/, e.g., wíslam *chipmunk*, kówkòwpem *gray*. /w/ never occurs after /u/ in the same syllable.

/j/ is a palatal semivowel with the quality of nonsyllabic [i] before or after /u/ or /y/ and before /i/, but somewhat lowered in quality before or after /e/, /a/ or /o/, e.g., jamánim *mountain*, pújkam *quail* /j/ never occurs after /i/ in the same syllable.

The phoneme /l/ is an apical alveolar lateral with no perceptible variants, and of unrestricted occurrence, e.g., lalámpem *long*, dáldàlpem *white*.

1.3. There appear to be no phonemic long vowels in NE Maidu; the long vowels which Dixon[2] wrote were apparently either (1) vowels followed by geminated consonants with the actual length in the consonants or (2) vowels with primary or secondary stress in open syllables (**0.1**). In fact, the varying vowel lengths are based on the following criteria:

Vowels are very short (less than one mora) in unstressed syllables.

Vowels are short (about one mora) in closed syllables with primary or secondary stress.

Vowels are long (about two morae) in open syllables with primary or secondary stress.

Table I shows the phonological variants for the NE Maidu vowel phonemes, including the sliding allophones. As was set forth in **0.3** above, the stations of these allophones are written at the left side of the formula.[3]

[2] Dixon, Roland B., Maidu Grammar, BAE-B 40 (Part I): pp. 679–738.

[3] The symbols in the table have the following meanings:

+ = word juncture
C = any consonant
— = the position of the variant under consideration
$\acute{}$ = the variant under consideration occurs with primary or secondary stress
$\underline{u}$ = the variant under consideration occurs unstressed
S = any syllable
/ = or

The glosses for the numbered examples in the table are as follows: (1) nose, (2) my, (3) thy, (4) dirt, (5) louse, (6) soda, (7) dark (acc. case), (8) horse (acc. case), (9) a kind of dance, (10) sugar pine, (11) elder brother, (12) boy, (13) wild pansy, (14) ant, (15) forehead (acc. case), (16) feather (acc. case), (17) woman (acc. case), (18) very,

TABLE I

	Environments						
	+C⌐S/+	SC⌐+	C$\underline{^{u}}$S	C$\underline{^{u}}$+	C⌐CS	C⌐C+	C$\underline{^{u}}$C
/i/	[i] híkym (1)	[i˅ > i] nikí (2)	[i˅] nikí (2)	[i > i˅] mínki (3)	[ɪ > i˅] mínki (3)	[i˅ > i] kàwím (4)	[ɪ] pedésim (5)
/u/	[u] súdim (6)	[u˅ > u] kulú (7)	[u˅] kulú (7)	[u > u˅] kawáju (8)	[ʊ > u˅] júkbom (9)	[u˅>u] sumúm (10)	[ʊ] ʔúsum (11)
/y/	[ɨ] p̣ýbem (12)	[ɨ˅ > ɨ] pykký (13)	[ɨ˅] p̣yċým (14) híky (1)		[ɪ̈ > ɨ˅] sýndakà (15)	[ɨ˅] pykkým (13)	[ɪ̈] híkym (1)
/e/	[ɛ˅] jé (16)	[ɛ] kylé (17)	tetét (18) péne (19)	[ɛ] wisétpem (20)	tetét (18)		[ɛ] wisétpem (20)
/o/	[ɔ˅] ʔó (21)	[ɔ] loló (22)	loló (22) júkbo (9)	[Ω] sólkan (23)	lolóm (22)		[ɔ] júkbom (9)
/a/	[ɑ] sáp̣ym (24) naná (25)		[ɑ˄] kàwím (4) wépa (26)		[ɑ] kákkam (27) nanám (25)		[ɑ˄] wépam (26)

The phonological variants of the vocalic phonemes

2. The two classes of sounds which are most affected by allegro speech in NE Maidu are the stops and the vowels. These two main categories will be considered in order below.

The acoustic effect of the implosion is considerably lessened by allegro speech in the case of /b/ and /d/. Careful observation reveals, however, that they are always imploded, albeit weakly.

In deliberate speech, the voiceless stops are unaspirated in certain environments (**1.2**); the aspirated allophones of these stops tend also to lose aspiration in rapid speech. Similarly, the glottalized stops become very weakly glottalized so that the aspirated and glottalized series fall together to some extent. This merging is incomplete, but only a practiced Maidu ear can clearly distinguish a glottalized from an unglottalized stop in an allegro utterance.

The most marked and pervasive effect of allegro speech is the centralization of the vowels in unstressed syllables. With respect to this centralization the six vowel phonemes fall into three pairs, as follows:

(1) /y/ and /a/ exhibit unstressed, rapid-speech allophones which approach [ə] very closely. At times it is difficult to tell an allophone of /a/ from an allophone of /y/.

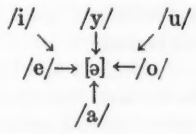
(2) /i/ and /u/ centralize just enough for the ear to catch the effect. Their movement to the center is accompanied by a marked drop to the neighborhood of [ɪ] and [ʊ] respectively.

(3) /e/ and /o/ do not approach [ə] so closely as /y/ and /a/, but they centralize much more than do /i/ and /u/.

These varying movements may be presented more clearly by means of the diagram below. The only governor to a free use of these allophonic continua is consistency in a given utterance. In such a given utterance, a speaker will choose all

(19) two (acc. case), (20) frightened, (21) rock (acc. case), (22) container (acc. case), (23) he sang, (24) three, (25) chest (of body) (acc. case), (26) coyote (acc. case), (27) crow. The references to the accusative case are for the first occurrence of each example; the suffix -m is the universal mark of the nominative case for all nouns and adjectives.

of his allophones at a balanced distance from [ə].



3. One of the most striking things about the noun and adjective stems in NE Maidu is the prevalence of vowel harmony. About forty per cent of the disyllabic stems have the same vowel in both syllables. In many cases this is associated with total reduplication of the syllable. However, vowel harmony gives scant indication of being functional in the morphology. Uldall[4] hints at some vestiges of operative vowel ablaut, even more in NE Maidu than in Nisenan, but this effect has not yet been isolated in the present analysis.

[4] Uldall, H. J., op. cit., pp. 15–16.

STRESS ACCENT IN WISHRAM CHINOOK

WALTER DYK
BROOKLYN COLLEGE

D. H. HYMES
HARVARD UNIVERSITY

0. Introduction
1. Sentence rhythm
2. Rhetorical uses
3. Morphemic elements

0. There is one phoneme of stress in Wishram Chinook, as apparently in all other Chinookan dialects.[1] Minimal pairs contrasting in the placement of stress have not been found for three major word-classes, Nouns, Verbs, and Pronouns. In the fourth major word-class, Particles, three instances can be cited. In Wishram Texts are found báma *in order that, for* WT 54.2, and bamá *since* WT 50.2, a contrast also noted in Dyk's manuscript Grammar of Wishram.[2] Also found are kʔwálalak *drunk* and kʔwalalák *crazy* in Wasco Chinook (cf. Kathlamet kʔualalák *crazy* Kt 224.3, but WT 8.11 kʔwálalaq *crazy*); and Wasco Chinook kwádau *and*, but kwadáu *now, first*, e.g. kwadáu ignuyim naika "California" *first time I went to California.*

The occurrence of stress, however, is greatly restricted in terms of a number of recurring patterns. Thus, while no one general rule can be given, the patterns that occur seem to involve but three kinds of factors; these are sentence rhythm, rhetorical uses of stress, and the effect of certain morphemic elements.

Edward Sapir, from a comparative study of related languages (Penutian), believed that accent had played a profound part in bringing the Chinookan languages to their present polysynthetic type. In the process of composition, vowels were gradually lost in unstressed syllables, and the remaining consonants began to be interpreted as affixes, their once independent status as monomorphemic words having been obliterated. The present complex and varied situation regarding stress accent probably represents in large part the outcome of such an historical development. There would seem to be certain basic morphophonemic rules of stress reflecting this historical development, which tend to prevail, but which may be overridden by considerations of style and context.

1. There is a prevalent rhythmic pattern in sentences and multimorphemic words. Typically a word has one and only one phonemic stress, but predictable secondary stress occurs on alternate syllables preceding and following that syllable with primary, phonemic stress. This alternating, iambic pattern tends to prevail in sequences of words also. As illustration, note the following passage from WT 78.12ff, as freshly dictated to Melville Jacobs (August 4, 1951) by Dyk's principal informant, Philip Kałámat:

aga kʷápt gakłúɬxam, "wítʔaɣ dáɣya dába amšúya díxt itqʷɬí." qúšdyaxà idmímlušdìkš itgaqʔúču gúɣigìɬɣal; kʷába gakłúkɬ. aga kʷápt gałúpga dàgapgáp itxʷdlít; qúšdyaxà itqʔúču čáwigàlqʷt; idmímluš-

[1] Wishram material collected by Dyk on field trips during the summers of 1930 and 1931, under the auspices of the Laboratory of Anthropology at Santa Fe, New Mexiço, and the Committee on Native American Languages of the ACLS; supplemented by material collected by Edward Sapir in 1905. Comparative references to other dialects supplied by Hymes on the basis of Wasco field work during the summers of 1951 and 1954, supported by the Phillips Fund, American Philosophical Society, and Indiana University Graduate School; from Hymes' manuscript grammar of Kathlamet; and from Boas' sketch of Lower Chinook, Shoalwater dialect, BAE-B 40, Part 1 (1911).

[2] Dyk, *A Grammar of Wishram*, Yale University doctoral dissertation, 1933.

dìkš. (Secondary stress also marked to show pattern.)

When there is variation in the placement of stress for occurrences of the same word, as tgwíwalal and tgwiwálal *they are dancing*, this seems dependent on the sentence rhythm pattern. Thus the usual form gayúya *he went* may not be found, but gáyuya, dependent on the place of stress in the preceding word. So also, generally aga kʷápt *and then* is found, but if the order is reversed, generally kwapt ága. (As sentence initial, aga normally is not stressed, or only secondarily in sequence with kʷápt; cf. Boas' transcription in Kathlamet Texts, where aqa is written without stress for the first part, then as áqa for the final pages, indicating that the presence of the normal secondary stress was detected late.) The pattern would seem to require aga kʷápt gayúya, but kʷapt ága gáyuyà *and then he went*. From this point of view, it seems likely that the contracted form àgayúya, sometimes found for aga gayúya *then he went*, is due to the pattern which permits at most two very short syllables to intervene between occurrences of stress. Thus *kwápt aga gayúya *and then he went* (with the position of normally unstressed aga introducing three successive unaccented syllables) becomes kwápt agayúya. Otherwise haplology does not seem to occur in Wishram.

As a rule, in sentences or syntactic phrases of two words, the first takes a somewhat stronger stress, and the stress of the second may be either reduced or (rarely) lost. Thus: ikála yùit and yúit ikàla *the man is going*; yáxibà yuɣt *over there he lives*; díka yaxka or diká yaxka *here he (is)* (the second with rhetorical emphasis).

2. Besides sentence rhythm, rhetorical considerations affect the placing of stress. In the sentence pattern described above, one word may occur with primary, even overloud, stress, the others with secondary stress; this occurs not only in the two-word sequences mentioned, but in these and others when the context and/or informant's responses indicate some emotive or cognitive force is intended. (This includes repetitions for the benefit of the linguist.) Thus, ordinarily we have in isolation wít?a *again* (or wít?aɣ), or in context wít?a dáukwa galíɣuɣ *again thus he did*; but also found are wìt?a dáukwa gàliɣùɣ and dáukwa wìt?a gàliɣùɣ; likewise, there occur both wít?a ìxt gayùya *again one went* and wìt?a íxt gayùya.

Rhetorical accent often is found at the end of the word with rhetorical lengthening of the vowel. Thus, we have itgwáɬilx *person* and itgwaɬɛ́· ɬx (emphatic, as in surprise) *some person, as it seemed*. (The frequent change of vowel quality to low front æ under rhetorical accent is found in all the Chinookan dialects; it has become lexically inherent only in a few color terms and other words in Wasco. It is probably intrusive in Chinookan from Salish, as is the case for northern Sahaptin; see Jacobs, Areal Spread of Sound Features, UCPL 10.54–55 (1954).) Also found are kánawi *all* and kanawá (more emphatic), gayúya *he went* and gayuyá *he went on and on*, dáminwa *always* and damínwa kwába *there forever*, and also kwabá. As seen from some of these examples, such difference of accent and concomitant vowel length is often accompanied by some different shading of meaning. Examples of different function of enclitics dependent on accent seem to be found: gatšiúɣ-bt *when he did it*, but gatšiùx-báet *as soon as he did it*; náika bàma *for me*, but nk?áškaš bamá *ever since my boyhood*. In verbs it seems that variation in accent does not bring about change in meaning.

3. The third set of factors accounting for Wishram stress placement is the occurrence of morphemic elements which either shift the normal accent of a word, or seem normally to require the accent themselves when they occur. It may be noted that stems of two or more syllables "normally", i.e.

predominantly and in simple constructions, are stressed on the first syllable of the stem; some seem never to be stressed otherwise, e.g. -qʔúču *bones*, occurring in the passage cited in section **1.** Non-syllabic and many monosyllabic stems occur with stress on the preceding syllable when prefixed, e.g. wátuł *fire*, wí-npu *flea*, čiú-tkt *he is putting him away*, gačig'l-ga *he got hold of him*, gačíx̣-pu *he closed him.* (The stem follows the hyphen.)

Examples of shift of stress correlated with the occurrence of affixes include galí-kim *he said*, but galixt-kím and galigímx̣ (with reflective x-, directive t-, and stylistic (semantically empty) -x̣, respectively); adúiha *cow*, but aduihámax̣ *cows*; naikába *at me* beside náika *I*; ičig'lga *he got hold of him*, but ačiglgáya *he will get hold of it*; ičtúdina *he killed them*, but ačtudínaya *he will kill them.* (Shift of accent backward in the future tense with the discontinuous morpheme a . . . . ya, as in the last two examples, is not as regular, however, as in Shoalwater (Lower) Chinook: ayamdúpgna *I shall call you*, but alternatively ayamdupgnáya.)

It must be noted that introduction of "inorganic schwa" to bear the accent, so common in Shoalwater Chinook and Kathlamet, is not characteristic of Wishram. Thus ičiúx̣ *he did it* does not have the correlative form *ičə́łux̣ (contrast Shoalwater Chinook ačə́łax̣); rather in such cases we have always an accent such as ičłúx̣ (i- is 3rd sg. masculine object prefix, ł- (SChx̌-) 3rd sg. neuter object prefix). So also ayáxan *his daughter*, but not *agáxan *my daughter* (cf. SCh ugúxu); the form is akxán.

As regards the placement of stress in specific morpheme sequences, it is, as already indicated, difficult to give general rules. Some attempt can be made, however, to establish some recurrent regularities.

3.1. The possessive prefix a-, characteristic of all but 1st and 2nd person singular with nouns, is accented. Thus, it-gíutkwax̣ *the poor ones*, it-k-gíutkwax̣ *I am poor* (*my poorness*), it-tx̣á-giutkwax̣ *we two are poor*; i-čá-łilxam *ten* (3rd sg. feminine possessor); id-iá-qwł *his house.* Possessive forms without a- are not accented. As stated, the alternant k- of the 1st sg. cannot be accented in Wishram (while Shoalwater and Kathlamet dialects accent it by introducing schwa); so also the other alternant č-. The 2nd sg. possessive prefix, mi-, is apt to be unaccented: a-mi-xán *your daughter*, beside a-yá-xan *his daughter.*

3.2. Demonstrative and personal pronouns, when not accompanied by local-relational suffixes, are accented on the first syllable. Thus: dáuya *this*, yáx̣dau *that*, yáxya *that*, náika *I*, štáx̣tʔa *those two also*, máima *you alone*, and with plural suffix, łáima-dikš *those alone*; but yaxká-ba *at that*, naiká-yamt *toward me.* These local-relational suffixes draw the stress backward in the word.

3.3. Monosyllabic and non-syllabic stems generally tend to occur with stress on the preceding syllable. With verb stems, this results in the prevalent stressing of the directive prefix u- (except that preceding transitive object prefix i- may be stressed alternatively). Thus: ičnú-gwilx and ičíu-gwilx (but also (rarely) ičiugwílx); ičnú-kšt and ičíu-kšt; ičšú-lxam and ičiú-lxam (generally, but also ičíu-lxam); ičmú-x̣ and ičiú-x̣ (generally, but also ičíu-x̣); iyú-ya, anú-ya, and iyú-kwa. (The stem follows the hyphen.) Some verb words with dissyllabic stems follow this rule: iksú-bna; gačłú-dina; gačšú-pgna. Many dissyllabic stems, however, are accented regularly on their first syllable: gayu-kʔwíxa; gału-xúnyu-ču or gału-xwní-ču.

Adverbial prefixes occurring immediately before the stem are also accented when syllabic: gačig'l-ga; nigí-tga; ičig'l-kl; łig'l-px; sqʔ'l-dalpł. Pronominal object prefixes occurring before the stem or adverbial prefixes, when syllabic, are accented: ičá-x̣ux̣; igí-x̣ux̣; ičiá-l-u-t; yá-l-gat; gačáw-i-qłaxit; igí-x̣-pšut; tksńi-bnaniłx̣. (Stem follows the last hyphen in a word.) Observe that in sequences of 3rd sg. feminine object

a- and 3rd sg. masculine object i- (the direct object prefix preceding the indirect object prefix), the á- receives the accent: gačiák$^{?}$uχ; gačáilut; ičáiχuχ; ičiáχuχ.

3.4. The prefix sequence χ- *reflexive* plus t- *directive* seems to cause stress to fall on the succeeding syllable: galákim *she said*, but galixtkím *he said*; nákim *she said*, but naxtkím *she said*; ganixtkíaχ *I did to him* (but kí- is accented in all forms).

3.5. In verb words without directive prefix u- or syllabic adverbial prefix immediately before the stem, the pronoun nearest the stem is accented if syllabic, otherwise the stem itself: galí-kim *he said*; galá-kim *she said*; galí-kta *he ran*; galugwákim *they said*. A few verbs, however, even when monosyllabic, always occur with stress on the stem: galix-k$^{?}$wá *he returned*.

3.6. Certain suffixes, -χ, -lal, -nan, -mama, -łx, -pčk, -wulx, and perhaps others, draw the accent backward in the word. Thus: galikímχ, but galíkim; čiuχúlal, yuwílal; ksubnánan; igidímam; galiktápčk; galiktáłx; gačig'lga, but gačiglgámam. Besides these adverbial suffixes of verbs, the distributive plural suffix of nouns, -maχ, has the same effect: wátuł, watúłmaχ; adúiha, aduihámaχ. The other plural suffix of nouns, -kš, -yukš, occurs both with and without this effect: itkiudányukš, and itkíudanyukš.

3.7. Particles, which normally are stressed on the first syllable, may retain this stress despite its disruption of the prevailing iambic-anapestic sentence rhythm. Thus, in the passage cited in section **1.** itq^{w}lí qúšdyaxà, itx^{w}dlít qúšdyaxà; and also from that page in WT, aga k^{w}ápt íwi, aga k^{w}ápt qídaw, aga k^{w}ápt lúq$^{?w}$, aga sáq^{w} lúq$^{?w}$; sáq^{w} k^{w}λk^{w}λ.

3.8. Particles that are reduplicated take stress on the second element: baw báw ičíuχ *he drummed it*; baq báq ičíuχ *he brushed it off*; iwi íwi ičíuχ *he inspected him*.

3.9. Certain particles are rarely, if ever, stressed: aga, as noted; alma, marking future tense; and others.

As has been stated, these are not mechanically operative rules, such that the placement of stress can be predicted in terms of them. Rather, their interaction results in a complex, partly unpredictable occurrence of stress. It is in terms of such a situation, presumably, that scattered instances of minimal stress contrast on particle words have arisen, no more than a handful in any one dialect, and apparently not uniformly as between dialects.

PAME (OTOMI) PHONEMICS AND MORPHOPHONEMICS

LORNA F. GIBSON
SUMMER INSTITUTE OF LINGUISTICS

0. Preliminary summary
1.0. Units larger than the phoneme
1.1. Word
1.2. Syllable
2.0. Phonemes
2.1. Consonant description
2.2. Consonant distribution
2.3. Vowel description
2.4. Vowel distribution
2.5. Nasalization
2.6. Tone-stress
3.0. Morphophonemics
3.1. Effect of nasalization on voiced stops
3.2. Effect of vowels on consonants
3.3. Effect of consonants on vowels
3.4. Effect of vowels on vowels
3.5. Effect of consonants on consonants

0. Pame[1] is a language rich in phonological features. Special attention of the reader is called to the unusual vowel system, the heavy consonant clusters, the great variety of syllable patterns, the combination of tone and stress, and the wealth of morphophonemic changes.

The segmental phonemes include 22 consonants and 5 vowels.[2] Of these, f occurs only in a few borrowed Spanish names and in the loan word kafé *coffee*. The suprasegmental phonemes include nasalization and three phonemes of tone-stress. Examples are cited in phonemic transcription, using the symbols listed in the following charts of segmental phonemes.

---

[1] Pame is spoken by small groups of Indians in central Mexico, nearly all of whom live in the state of San Luís Potosí. This paper treats that dialect of North Pame spoken in and around the monolingual center of Santa María Acapulco, close to the southeast border of the state. By far the largest dialect group, they number approximately 1500. (They themselves prefer to be called Chichimecas, but they must not be confused with the group of 300 Chichimecas—"Chichimeca Jonás"—of the state of Guanajuato.)

The present extent of the tribe has been investigated by Antonio de la Maza, and reported in La Nación Pame, Boletín de la Sociedad Mexicana de Geografía y Estadística 63. Núm. 2495–575 (1947). He gives the following information: the South Pame dialect is still spoken by some 300 Indians (many of them mixed with the Otomies), around Jiliapan, Tilaco, Pacula, Misión, Deconi, and El Doctor, near the border between the states of Hidalgo and Querétaro; dialects of North Pame are spoken in the state of San Luís Potosí by 1300 Indians at Santa María Acapulco, 95 percent monolingual; by 600 bilinguals in the region of La Palma; by 300 at Alaquines, mostly bilingual; at Ciudad del Maiz there are 250, 80 percent of whom speak only Spanish. At Naola in the state of Tamaulipas he found two individuals who still remembered some words of Pame, while many others in the vicinity spoke of their grandparents who had known the idiom. Dr. de la Maza estimates the total number of Pames at about 3000.

Data for this paper were collected during a series of field trips from 1945–55 under the auspices of the Summer Institute of Linguistics. My principal informants were Sra. Ascenciona Durán de García, over 50 years of age, who can speak a little Spanish, and Sra. Juana Montero de Rodríguez, about 35 years of age, who is completely monolingual. Though living only a mile apart their pronunciation of certain final consonant clusters, as well as some grammatical forms used, represent two different speech varieties, which will be designated (A) and (J), respectively.

Grateful acknowledgement is hereby made to Anne Blackman Olson, my collaborator in the early stages of the investigation; and to Kenneth L. Pike and Eunice V. Pike of the Summer Institute of Linguistics for their training and helpful suggestions.

[2] My present analysis leads me to a phonemic transcription which differs slightly from that used by my colleague Donald Olson in his "Mode-Aspect-Person Inflection in Pame", submitted to IJAL.

	Bilabial	Alveolar	Velar-Pal.	Back
Stops				
Voiceless	p	t	k	ķ
Voiced	b	d	g	
Affric.		c	č	
Sililants				
Fric.		s	š	
Fricative	f			
Glottals				ʔ
Stop				
Fric.				h
Nasals	m	n	ŋ	
Laterals		l	lʸ	
Vibrant		r		
Semi-vowels	w		y	

	Front	Back
High	i	
Mid		
Close	e	
——		o
Open	ɛ	
Low	a	

1.0. Units larger than the phoneme need to be defined for Pame since allophones of both consonants and vowels depend upon their distribution in the word and syllable, and since the distribution of consonant clusters is significant within the word, while the distribution of vowel phonemes is significant within the syllable primarily.

1.1. A word in Pame may be defined phonologically as a minimal utterance. A simple word has one and only one phoneme of tone-stress. Compound words may have two phonemes of tone-stress. Three words have been recognized as compounds: sé-skaʔài *ten* (from se *which* and skaʔài *my hands*), kiŋgyè-mèhɛp *half* (from kiŋgyèʔp *inside, middle* and mèhɛp unidentified morpheme), či-mès *drizzle* (from či ~ čiʔɛ́ʔ *little* and mès *rain, it is raining*).[3]

A clitic cannot form a minimal utterance. Clitics are without tone-stress, except for the alternate ḿmba of the postclitic mba *it is probable*. The stressed alternate ḿmba occurs when there is no preceding word on which it may lean, that is, in utterance initial position. In terms of minimal utterance and tone-stress, clitics are part of the following (or preceding) word; but in terms of permitted phoneme sequences and allophonic distribution of /a/, the proclitic ma acts like a separate word. Clitics are written preceded and followed by space like words, but are identifiable by their lack of tone-stress. Common proclitics are: ne *the* (sg.), re *the* (pl.), se *which, who, when* (conj.), či *little* (sg.), lʸi *little* (pl.), ma *going to* (verb auxiliary particle).

In utterances word boundaries may be identified by a combination of tone-stress features, numerous word-final consonant clusters which are different from clusters in word-initial and word-medial positions; the distribution of various consonant and vowel allophones; and in some instances syllable division.

1.2. A phonemic syllable in Pame is conveniently defined as a segment or a sequence of segments which potentially may occur with a phoneme of tone-stress. Included are syllables of pattern -CV(VCCCC) (C representing any consonant, V representing any vowel, and parentheses indicating optional occurrence of any or all of the phonemes enclosed) which, as a matter of fact, never carry contrastive tone-stress because they constitute the second syllable of a stem having tone-stress on the first syllable or on the prefix, e.g. wómmaʔaigŋky *they are standing*.

Every vowel cluster as well as every vowel not in a cluster forms the peak of one and only one phonemic syllable.[4] Reminiscent of Mazateco (which also is described

[3] či-mès, though composed of a proclitic and a stem, is treated as a compound for the following reasons: there is phonetic raising of /e/ following /i/, vowel assimilation which has not been noted between či and other words; on the other hand, the fact that m is not palatalized in či-mès, indicates a special intra-word juncture which may well be represented by hyphen.

[4] Voiceless syllables are no exception. The informant hummed /ŋgopʔóho/ *seat*, as three syllables, even though the final one is optionally voiceless.

as having only one back vowel phoneme), Pame syllables have complex peaks in which "two vowels are pronounced together very rapidly, so that the timing seems to be about the same as that for a single vowel. The nucleus of the syllable takes about the same length of time—within the limits of perception—regardless of the number of vowels it contains, whether one or two or three."[5]

The timing of a syllable in Pame depends not on the number of vowels it contains, but on the tone-stress features primarily. FAST syllables are those occurring with high tone-stress /'/, or without stress immediately preceding a stressed syllable, or without stress immediately following a high tone-stress, or the final syllable of a three-syllable word having stress on first syllable—provided no voiced consonant follows the syllable peak. SLOW syllables are those occurring with low /`/ or glide /ˆ/ tone-stress, or without stress following a low tone-stress, or the secondary stressed syllable of a two-syllable word (i.e., second syllable preceded by CV̄CC-, as described in **2.6.**), or the medial syllable of a three-syllable word having stress on first syllable, or the final syllable of such a word—provided a voiced consonant follows the syllable peak. The FAST syllables of ordinary speech may become SLOW syllables in slow speech.

Canonical shapes of Pame syllables containing one vowel range from V through CCCCVCCCC, the largest syllable with vowel initial being VC. Pattern CVCCCCC has been found, also. Syllables containing two vowels range from CVV through CCVVCCCCC, with pattern CCCCVVCC also found. Syllables with three vowels range from CVVV through CCVVVCCC, with pattern CCCVVV found also. The following examples illustrate a little of the variety of syllable patterns. In the remainder of section **1.2.** syllable division is represented by a low dot [.]. ma.pâ *hot*, i.hyǫ́ʔ (also hyǫ́ʔ) *my names*, ko.dóat *walk* (sg.imp.), tiɳ.ʔòaikʔy *you walked* (du.), ŋgwâoi *her daughters-in-law* (du.), ŋkhwébmpt *their saliva*.

Besides vowel peaks, m is stressed and forms the peak of a syllable in the unique particle ḿ.mba *it is probable*.[6] In mbà *handkerchiefs*, m constitutes a slight phonetic syllable but not a phonemic one; so also the n of nthôi *woman*, the ŋ of ŋkhwèlʔ *beards*, and the nl of nlʔòs *houses*, etc.

Medially in a word, syllables divide between a nasal consonant and a following stop, affricate, ʔ or h—provided the stop or affricate is not followed in turn by ʔ; also between a lateral and a following ʔ, h, stop or nasal; also between an affricate and a following h; also between identical consonants in a cluster (with a proclitic treated as a separate word: ma ttǫ̀ *he is going to die*). Examples: man.dàị *great* (sg.), tan.thôi *I'm a woman*, kiɳ.gyáogŋ *price*, coɳ.khwês *grand-daddy-long-legs* (sg.), nin.čáolʔ *sugar* (sg.), son.chíɳ *curls* (noun), nim.ʔígŋ *thick* (sg.), niɳ.hą̀ *word*, tím.hyɛ̨ŋ *I, you play* [*game*], ndol.ʔéhoʔ *they scorned him*, ŋgol.ʔwî *young one* [*of animal, fruit, or new moon*], šilʸ.ʔyê *medicine*, ŋgol.hàʔ *bow and arrow*, ŋgol.hwé.ʔi *square willow basket*, stilʸ.háigŋ *feather*, telʸ.gyá *six*, telʸ.ŋyò.higŋʔ *seven*, skác.hadnk *I'm embarrassed*, ndoc.hào *they did it, made it*, tič.háoʔ *they study*, kád.doa *white*, wam.mę́oŋ *sand*, čim.myóʔ *skull*, rip.pyàiky *his children*, šib.byá.ʔailʸ *curing ceremony*, not.twì *I finished it*, cop.phà *bumble bee*, et.tócʔ *my sandals*.

In medial clusters of ʔ following stop or affricate, the syllable division seems to fall in the middle of the stop or affricate in normally rapid speech, so that the first syllable patterns as a closed syllable: satʔèʔ *sheep* (sg.), ŋgokʔwéš *paper, book*, wacʔódn *they dislike him, it*, kičʔìʔ *milk*. In clusters of nasal, plus stop or affricate, plus ʔ, syl-

[5] K. L. Pike and E. V. Pike, Immediate Constituents of Mazateco Syllables, in IJAL 13.78–91 (1947), p. 78.

[6] It is unique in that tone-stress occurs on the nasal consonant in this one morpheme only. Note explanation in **1.1.**

lables divide before the stop when stress is on the second syllable, but optionally before or after the stop when stress is on the first syllable: čin.č?ęs *gizzard*, ndom.b?wé.-hil^{y}? *they dampened it*, but wáŋ.g?ę.?eš or wáŋg.?ę.?eš *it makes it pliable*. Syllable division falls in the middle of the nasal in a cluster of nasal plus y: nímyao *wind*, kiŋyôp *Thursday*. Syllable division falls in the middle of the s in the cluster sk, which occurs medially only in the compound sé-ska?ài *ten*.

Elsewhere syllables divide before a medial consonant or consonant cluster: ka.hó *witch-doctor*, ti.šáo? *I, you study*, ro.thǫs *my salt*, pi.kyàok *my forehead*, ŋgo.dwì *your child*, ŋgo.khwíɳ *wart*, ri.khyè? *his beans*.

2.1. Voiceless stops p, t, k, ķ are unaspirated, fluctuating to slightly aspirated, as shown by spectrograms,[7] in word initial and medial: pàsk *I am warmed up*, taŋgào?t *rest yourself* (sg.imp.), kêič? *they* [*heavy weight things*] *are on top of*, ķêi *they hunt* [*for game*] (du.), kapę́ *thief*, ndatèo? *late afternoon*, takèigŋ *my stone grinding mill*, maķèi *fragrant* (sg.). In clusters of identical consonants, however, stops are unaspirated: makkwà *my foot*; cf. makwà *his foot*, where k may be aspirated. Preceded by i, k has palatal fronting whether or not it is followed by y: likyèhe *he has muscle cramps*, šikè? *adult, elder, chief*. Back ķ contrasts with velar-palatal k only before vowels /e, ɛ/. The contrast is neutralized elsewhere.

In word-final position preceded by a homorganic nasal, p, t, k (ķ has not been observed word final) fluctuate from slightly aspirated to unaspirated or even slightly voiced: ndo?wàhabmp *he asked him*, rikywą́nt *males*, ŋganą̀oŋk *my head*.[8] In word final position at the end of an utterance when not preceded by a nasal, p, t, k, appear to fluctuate freely between aspirated and unreleased allophones; word final in the middle of an utterance the stop varies from aspirated to unaspirated with close transition to the following word: ndosêp *he told him*, sathwą̀t *ants* [*small brown variety*], šôtk *my cloth*.

Voiced stops are b, d, g: bài *much less*, dóa *he walks*, gyò?t *listen* (sg.imp.), nambà *my handkerchief*, ŋgodôa *century plant*, ŋgobógŋ *cactus* [*prickly pear variety*], ndómmį *if I had* (unreal perfective aspect). Before a homorganic nasal in final clusters, b, d, g, have allophones which are articulated very slightly and rapidly: rawébm? *our mother* (du.-pl. excl.), lo?wêdnk *he curses me*, no?wêogŋ *I gave it to him*. In clusters -nd?- and -ŋg?-, d and g may fluctuate to voiceless, as the voiced-voiceless contrast is neutralized in this position. Since the voicing is heard more frequently than not, the consonant is assigned to the voiced series:[9] skand?ài *a hand-breadth*, wáŋg?ę?eš *it makes it pliable*.

Affricate sibilants c and č are normally voiceless unaspirated:[10] cómhɛ *butterfly*, čôt *scold him* (sg.imp.), čǫ́? *now*, cíl? or cél? *hole*, číč?o *bad, dirty, ugly*. In medial, intervocalic position, however, c may fluctuate from unaspirated to slightly aspirated

---

[7] For spectrographic analysis I am indebted to Fred W. Householder and George Motherwell, Indiana University. The spectrogram showed the k in kíhwa?a *you should bring it* (sg.), occurring as a "front palatal aspirated" variety. This is in phonemic contrast with the heavy aspiration of the cluster /kh/ in words like khó?i *they put on* [*skirts*].

[8] The contrast between voiced and voiceless stops is neutralized in this position (word final after nasal), but the stop occurring here is assigned to the voiceless series, since in most cases it is one of the suffixes which appear elsewhere as -p, -t, -k.

In macíkŋ? *our jug* (du.-pl. excl.) the k was shown by the spectogram to be lightly voiced; however the voiceless-voiced contrast is not neutralized in this position (before a nasal); cf. heavily voiced /g/ in maccígŋ? *dissolved, faded*.

[9] Morphophonemics provides examples of the -nd?- cluster derived from both d and t: rand?-éhedn? *their money* < ra- + ?- + -ndéhedn? *money*; skand?ài *a hand-breadth* < ska- + t- + -n?ài *hand*. Prefixes ?- and t- are allomorphs of the same morpheme, and metathesize with stem-initial consonant(s).

[10] Affricates have been classed as sibilants because of morphophonemic alternation of c with s, and č with š.

or slightly voiced, as shown by spectrograms made of various forms of the word macì *jug*.[11] Voiced, though at times weakly voiced, allophones of c and č regularly occur following n:[12] mancí *holy* (sg.), ninčáol? *sugar* (sg.); except, however, that affricates freely fluctuate between voiced and voiceless after n but before ? in clusters nc? and nč?: nc?o̱k *my paternal aunt, aunt by marriage*, ninč?ę́s *sharp-pointed* (sg.); and remain voiceless after n but before h in the cluster nch: nchą̀st *the itch*, ndancháo? *eight*. Affricates are aspirated in rare word-final position, of which the only observed occurrences are: hóc *older sister* [*term used by girls*], waŋgóč (Mex. Span. guangoche *gunny sack*) *bag*.

Fricative sibilants s and š are voiceless: sámp *yesterday*, sí *rustling sound*, šą̀st *play* [*music*] (sg.imp.), šíšši *grass*.

Glottal stop ? and glottal fricative h are voiceless. ? is unaspirated word initial: ?ywą́ŋ *my husband*; word finally it is at times unaspirated, at other times in variation with an aspirated release (which at first hearing may easily be confused with a lenis k, but which clearly contrasts phonemically with k and with final clusters ?k, ky, ?ky: kasáo? *teacher*, káok *I, me*, kasáo?k *I (am) a teacher*, chèi? *they bathe it*, chèiky *they tell me*, chèi?ky (also chè?ky) *they bathe me*). Following voiceless stops and affricates in word initial and final clusters, but only optionally in word medial clusters, ? is actualized as glottalization of the preceding stop or affricate: ḳ?éhe? *they take it out*, c?ók *they scold me*, ndót?ęi *they did that way*, ác?o̱ *your mother*.

The glottal fricative h has very slight friction and varies in position of articulation according to that of the contiguous vowel: hàl? *it glows*, nhô *your sibling*, nhi̱ *this*.

Nasals m, n, ŋ, are normally voiced at bilabial, alveolar, and velar-palatal points of articulation, respectively: mahą̀č? *tall*, naná *heron*, ŋgáccɛk *my respect* [*for someone*], lik?ą̀ham *really*, kimmyą́n *you want* (pl.) kimmyą́ŋ *you want* (sg.). Before a homorganic voiced stop, in initial clusters and in medial clusters where stress is on the following syllable, m, n, ŋ, occur as quick nasals, only slightly voiced fluctuating to voiceless: ndá *one*, čiŋgêi? *parrot*. In the latter, where the nasal occurs syllable final, unvoicing of the nasal is accompanied by a shortening of the preceding vowel, which may even drop out entirely (as demonstrated by spectrographic analysis), leaving ŋ as the syllabic of a voiceless syllable.

Laterals l and lʸ are voiced: lébm? *our parent-in-law* (excl.), lʸêbm? *we (are) people* (pl. excl.), lamą́ *he will go*. Voiced affricate allophones [ᵈl] and [ᵈlʸ], respectively, occur in word final or anywhere in a word final consonant cluster when nasalization is not present: sandàl (Span. soldado) *soldier*, sandàilʸ *soldiers* (du.); they occur optionally in a word medial consonant cluster: šilʸ?àho *advice*. Nasal allophones [ⁿl] and [ⁿlʸ] occur with the phoneme of nasalization, which is a suprasegmental phoneme beginning with the vowel so marked and continuing to the end of the word: snahộl? *his shirt, her blouse*, snahộilʸ? *their* (du.) *shirt*, ta?ę́hilʸk? *you sleep* (du.). Contiguous to the back vowel, a low, 'dark' allophone of l occurs: lómma?a *he remembers*, nikyòl? *it broke*. Contiguous to a front vowel, a 'light', fronted allophone occurs; the palatal lʸ is even higher than the fronted high allophone of l, with which it is in phonemic contrast:

[11] The c in the stem was seen to fluctuate from voiceless unaspirated in macì, to aspirated in macèp *her jug*, to voiced in macìky *my jug*, with weak voicing in macìkŋ? *our jug* (du.-pl. excl).

[12] The fact that t following n (like k or p following ŋ or m, respectively) does not necessarily become voiced, is clear evidence for interpreting [ts] as one complex phoneme /c/; e.g., n[t]ómmi̱ *if I had* (unreal progressive), but n[dz]wés *sores* (ŋgo[ts]wés *a sore*). However, t is replaced morphophonemically by d when it occurs with the n-noun prefix: ndóŋ *flowers*, ŋgotóŋ *flower*. Noun prefix n- voices a following voiceless stop or affricate, while verb prefix n- does not voice a following voiceless stop, and has not been found occurring with affricates.

čikíl$^{?}$ *goat*, čikíl$^{y?}$ *goats* (du.), li$^{?}$í *they give to each other* (du.), l$^{y?}$í *child*.

Initially r is a trilled vibrant which may be voiced, weakly voiced, or voiceless: rawí *my mother*, ramą́ *he goes repeatedly*, ril^{y}háig-ŋky *birds*; at other times it is a single quick voiceless aspirated flap, in phonemic contrast with t: rišó$^{?}$t *bundles*, cf. tišáo$^{?}$ *I, you study*. However, r is a single voiced unaspirated flap in word medial position, observed in only three words, probably of Spanish origin: warèiky *burro*, waróhh (Span. brujo) *sorcerer*, krós (Span. cruz) *cross*.

The semi-vowel w, though bilabial, is not noticeably rounded. It is voiced except following h, where it is normally voiceless: ŋgowàhal$^{?}$ *horse*, kíhwa$^{?}$a (also kíhywa$^{?}$a) *you should bring it* (sg.). It is frictionless when in cluster with other consonants, when intervocalic between back vowels, or when initial before o or a:[13] ŋgokhwè$^{?}$ *monkey*, nowôt *I gave it to them*, wóppɛhɛ *he carries it*, wancá$^{?}$ *baskets*. It is slightly fricative between two front vowels; or in word initial before vocoids i, e, or y; or medial between a preceding front vowel and a following back vowel: níwwigŋ *you gathered* (sg.), rawé$^{?}$ *my father*, wíyɛo$^{?}$ *your father* (sg.), wyôt *give it to him* (sg.imp.), niwyôk *you gave it to* me (sg.). There is free fluctuation between the fricative and frictionless allophones when w occurs between two a's, or when word initial before ɛ, or when medial between a preceding back vowel and a following high or mid front vowel: lawwáho$^{?}$tk *lend me* (sg.imp.), wɛ́t *hand it here*, nowèi *we waited for him* (du.incl.).

In cluster with other consonants, w has three main allophones besides [w]. In cluster with alveolar consonants in general, w is half-syllabic [^{u}]: cwí$^{?}$ . . . *him to suck*, ŋgodwì *your son, daughter*, kolwé *owl*, ndottwì *he finished it*, konwę́l$^{?}$ *it became full*, ŋgonwę́ *thunder*, koncwégŋ *he got angry*. In cluster with initial n, w is [u^{w}]: nwę́t *thunders* (pl.). (Here /w/ contrasts with /o/, which would be nasalized in cluster with ę.) In cluster with $^{?}$ or h, and followed by mid or low front vowels, w is half-syllabic [^{o}] fluctuating with [w]. When the allophone [^{o}] occurs, it is conditioned by the onset of tone-stress beginning a fraction of a second sooner. Examples: ŋgol$^{?}$wê *hill*, $^{?}$wę́iky *mosquitoes*, $^{?}$wę́he$^{?}$kŋ *you are sleeping* (pl.).[14]

The semi-vowel y is a voiced palatal: yót (Span. yute) *jute fibre*, niyáho *fox*, liyát (Mex. Span. ayate) *carrying net*. In consonant clusters *y* is normally an off-glide of the preceding consonant:[15] nipyę́ *you stole* (sg.), kikyé$^{?}$ *you use* (sg.), nimyą̀iŋ$^{?}$ *spherical* (sg.), kiwyôk *you should give to me* (sg.). In cluster with bilabials, [^{i}y] occurs in slow syllables, as defined in **1.2.**: nimbyò *its base*, niwyò *name of a certain Mt.*, níbbya-hagŋ *his skin*.[16] In cluster with initial n or

[13] This is the one point that I see in favor of classing /a/ as a back vowel. Nevertheless, /a/ fluctuates freely from [a] to [æ] in certain positions, with no allophones which are phonetically back. Labializing stems have labialized allomorphs only after /o/, not after /a/. Moreover, /a/ clusters with /o/ in syllable peaks in a manner parallel with the other three front vowels.

[14] In some words /o/ has developed from what was no doubt originally /w/, by a shift of the on-set of stress, usually after an alveolar consonant. Examples: lottóehɛl$^{?}$ *it penetrates*, (cf. lattéhɛl$^{?}$ *it will penetrate*), kottǫ́ɛ$^{?}$ɛ *he spoke*, (cf. tattę́$^{?}$ɛ *I spoke*), ŋgosǫ̀ɛ *a stamp, seal*. The vowel cluster /oɛ/ is found only in such situations. (For the parallel development of i from y, see footnote 16.)

Likewise /w/ has developed from an original /o/ by a shift in the timing of stress to the following vowel: both forms, manhòa and manhwà *wing*, makkòa and makkwà *my foot*, are in use.

[15] For a long time we interpreted y off-glide of consonants as predictable palatalization in word medial and final positions. At last I found a few convincing contrasts between heavy and light palatalization, so am interpreting the heavy as /y/: rik$^{?}$yè$^{?}$ *his clothes*, kik$^{?}$ài *five*; mi$^{?}$yá *all, whole*, wi$^{?}$át *all* (pl. animate), ši$^{?}$àp *when*, likyèhe$^{?}$ *he kneels*, šikè$^{?}$ *adult, elder*; šil$^{y?}$yê *medicine*, šil$^{y?}$àho *advice*, šil$^{y?}$ǫ́$^{?}$o *pointing-finger*. The bulk of the data in this paper still needs thorough checking as regards this contrast.

[16] In the same way that /w/ has developed into /o/ by a slight difference of timing in the on-set

medial mm, y is [iʸ] before low front vowel a: nyáp naʔwà *he has something on his heart, is sad*, kímmyaʔa *you should remember* (sg.).

All consonants except r and f have unreleased allophones and fortis allophones, which occur in clusters containing two identical consonants, the first of the two being unreleased and the second fortis. In word initial or medial positions the cluster is actualized phonetically as a long consonant with fortis release: koppúʔ *he descended*, ttǫ̀ *he dies*, lokkwáhiʔ *he believes*, kaddèoʔ *a youth*, niggyéʔo *its gall*, máʔʔa *certain herb [used for eye medicine]*, máhhacʔ *warmed by the fire* (with voice diminished toward the center of -hh- on spectrogram), nowwódn *I erased it*, miyyą́ *rotten*. In word final position such clusters are rare and are phonetically a long consonant, without fortis release in words of native origin: kišą́nn *you stir it* (pl.); fortis in the loan word waróhh (Span. brujo) *sorcerer*.

2.2. Consonants occur singly and in clusters in word initial, medial and final positions. Consonant clusters consist of two, three, or four consonants in word initial position; two, three, or four consonants in word medial position; two, three, four, or five consonants in word final position.

Consonants appearing in word initial position as C- are: p, t, k, ķ, b, d, (g in loan word), c, č, s, š, (f), ʔ, h, m, n, l, lʸ, r, w, y, (but not ŋ). Examples: pikyê *rain*, talógŋ *chicken*, kâocʔ *across*, ķéʔɛ *back again*, bài *much less*, dóa *he walks*, gayét (Span. galleta) *cookie*, célʔ *hole*, čêʔky *carry or lead it [baby or animal]* (sg.imp.), sô *he fishes*, šôt *cloth*, fariséos (Span. Fariseos) *Pharisees [marchers at Holy Week fiesta]*, ʔêiš *it sours*, héokʔ *you* (sg.), mǫ̂cʔ *it is piled up*, nǫ́t *in order not*, líčʔo *it spoils*, lʸi *small* (pl. adj. proclitic form), ríčʔo *his guilt*, wôt *it barks*, yà (Span. ya) *already done*.

Word initial CC- clusters consisting of identical consonants found thus far are: pp, tt, bb, cc, ss, ʔʔ, hh, mm, nn, ww, and yy. Examples: ppóhogŋ *it limps*, ttódn *it blossoms*, bbái *they command him*, ccígŋʔ *it fades, dissolves*, sséhigŋky *they eat [a meal]*, ʔʔɛ́hilʸʔ *he sleeps*, hhâo . . . *him to turn good*, mmáʔa *he shouts*, nnǫ́aʔa *he plows*, wwɛ́ʔɛ *he bends over*, yyą̀ *it rots*.

Initial CC- clusters with ʔ as second member are: pʔ, kʔ, cʔ, čʔ, mʔ, nʔ, ŋʔ, lʔ, lʸʔ. Examples: pʔóho *they sit on*, kʔą́hont *they drive them [animals]*, cʔâcʔ *it jingles*, čʔɛ́ʔ (also čiʔɛ́ʔ) *small* (sg), mʔą̀oʔ *months*, nʔi̧at *they come and go away*, nímmyǫhiʔ ŋʔi̧ŋ *water-melon*, lʔècʔ *they put them down on*, lʸʔɛ́ʔt *small* (pl.).

Initial CC- clusters with *h* as second member are: ph, kh, ķh, ch, mh, nh, ŋh, lh. Examples: phégŋʔ *the one over there*, khóʔi *they put on [skirts]*, ķhéʔ *they use*, châs *they play [music]*, mhɛ́ *tortillas*, nhèo *his sibling*, ŋhèiky *fan it [fire]* (sg.imp.), lhàičʔ *they like it*.

Initial CC- clusters with w as second member are: kw, cw, ʔw, hw, nw. Examples: kwás *straight, true*, cwíʔ . . . *it to nurse*, ʔwɛ́heʔkŋ *you are sleeping* (pl.), hwèo *my sibling*, nwɛ́lʔ . . . *it to become full*.

Initial CC- clusters with *y* as second member are: ky, dy, gy, šy, ʔy, hy, my, ny, wy. Examples: kyàodntʔ *buy* (sg.imp.), Dyós (Span. Dios) *God*, gyàltʔ *throw it* (sg.imp.), šyɛ́ʔɛt *spread it out* (sg.imp.), ʔyóiky *savages*, hyáigŋ *we might remain* (pl.incl.) myǫ̂stʔ *pile it up* (sg.imp.), nyǫ̂t *see, examine it* (sg.imp.), wyôt *give it to him* (sg.imp.).

Initial CC- clusters composed of a nasal followed by a homorganic consonant are. mb, nd, ŋg, ŋk, nt, nc, ns, nl. Examples: mbàs *finger-rings*, ndómmį *he had it, had to*, ŋgokwą́ŋ *tree, stick*, ŋkodóa *if you would walk* (sg.), ntómmį *if I had* (prog. aspect), ncá *craw, crop, cud*, nsą́oŋ *nights*, nlómmi *if he had* (prog. aspect).

Initial CC- with s as first member are: st, sk, sm, sn, sl. Examples: staʔą̂i *my farewell*, skiʔì *smoke, haze*, smáncoʔol *bitten*, snaʔíʔ

---

of stress (see footnote 12), so /y/ has developed into /i/ after bilabials in some words: nibíɛ *his bed*, (cf. nobé *my bed*).

(also snaʔéiʔ) *souvenir of him*, slahą̂o *pigeon*.

Initial CC- clusters composed of a stop followed by a nasal or lateral are: tm, km, kn, tl, kl, (kr in loan word). Open transition frequently occurs between the stop and continuant, with predictable back vowel quality when the following vowel is o. Examples: tmattę̀heʔt *I'm married*, kmawái *your bidding* (sg.), knihíʔ *you entered* (sg.), tlombê *I crave*, klombê *you crave* (sg.), krós (Span. cruz) *cross*.

Initial CCC- clusters with nasal as first member and ʔ as third member are: mbʔ, ŋgʔ, ncʔ, nlʔ. Examples: mbʔóho *seats*, ŋgʔáhabmp *they go around out of their way*, ncʔôeʔp *their tails*, nlʔǫ̂ŋ *seeds*.

Initial CCC- clusters with nasal as first member and h as third member are: mph, nth, ŋkh, nch, nlh. Examples: mphói *manure*, nthôi *woman*, ŋkhàʔ *also*, nchą̀stʔ *the itch*, nlhí *cane* (pl.).

Initial CCC- clusters with nasal as first member and w as third member are: ŋgw, ncw, nʔw, nhw; with lateral as first member and w as third is lʔw. Examples: ŋgwèlʔ *his beard*, ncwés *sores*, nʔwą́ŋ *your husband*, nhwáʔa . . . *him to arrive*; lʔwíky (also nlʔwíky) *young ones* [*of animals or fruit*].

Initial CCC- clusters with ʔ or h as third member, and the first and second members identical are: ccʔ, ķ̨kh. Examples: ccʔáoʔ *they feel*, ķ̨khéʔi *they gather them up*.

Initial CCC- clusters with y as third member, and the first and second members identical are: ppy, ʔʔy, nny. Examples: ppyóʔtn . . . *us to descend* (pl.incl.), ʔʔyáhoʔ (also íʔʔyahoʔ) *my barbecues*, nnyą́hiky *tease me* (sg.imp.).

Initial CCC- clusters with nasal as first member, ʔ or h as second, and y as third are ŋʔy, ŋhy, mhy. Examples: ŋʔyǫ́hištʔ *jump over it* (sg.imp.), ŋhyǫ̀stʔ *put it* [*heavy weight*] *down on* (sg.imp.), mhyę́ʔep (also mihyę́ʔep) *he is speedy, prompt*.

Initial CCC- clusters with second and third members identical are: mbb, lhh. Examples: mbbéʔi *musical instruments*, lhhę́ʔɛ *tamales*.

Initial CCC- clusters with y and w as second and third members, respectively, are: kyw, ʔyw. Examples: kywą́ŋ *man*, ʔywą́ŋ *my husband*.

Initial CCC- clusters with n and d as second and third members, respectively, are: knd, snd. Examples: kndakʔódnʔ *dry, dusty place*, sndá *one and the same*.

Initial CCCC- clusters are composed of a stop, affricate, or lateral l, preceded by a homorganic nasal and followed by ʔ or h, plus w: ŋkhw, ŋgʔw, ncʔw, nchw, nlʔw, nlhw. Examples: ŋkhwèʔ *beans*, ŋgʔwéš *papers, books*, ncʔwéʔ *clay pots*, nchwì *fire-wood*, nlʔwèpt *their children*, nlhwę̀ *ropes*.

Consonants appearing in word medial position as -C- are all except g and ŋ. Examples: kopúʔ *ground, earth*, watòi *his grandmother, her grand-child*, šikèʔt *adults, elders*, waķ̨éš *certain translucent stone* [*mixed with clay for pottery*], kobáʔo *far*, ŋgodèocʔ *bridge*, ŋgocóʔ *shrimp* (sg.), ničôk *you scolded me*, lasáʔp *I teach him*, kišáʔp *you teach him* (sg.), koʔògŋ *turkey*, kihéš *your knife*, kafé (Span. café) *coffee*, komóʔ *gourd*, tanậ *my tongue*, walî *many*, nilʸî *it became many*, warèiky *burro*, ŋgowòʔ *bull-frog*, niyáho *fox*.

Word medial -CC- clusters consisting of identical consonants are: pp, tt, kk, ķ̨k, bb, dd, gg, cc, čč, ss, šš, ʔʔ, hh, mm, nn, ll, lʸlʸ, ww, yy, (but not ŋŋ, rr, ff). Examples: koppóʔ *he descended*, wattòi *they watch over it* (du.), nakkó *dove* [*small species*], waķ̨ķ̨éʔ-edn *he drags it*, nibbéʔi *his musical instrument*, kaddèoʔ *a youth*, čiggí *legendary creature* [*which flies at night and accompanies adulterers to keep them from being afraid*], loccìgŋʔ *he cleans it*, niččìgŋʔ *clean*, massócʔ *tied up*, šiššòagŋ *peeling skin, dandruff*, máʔʔa *certain herb*, kihȉéš *you warm it* [*pottery, before firing it*], kommóʔ *turtle*, nannèhigŋ (also nannę̀hiŋ) *he went out, it turned out*, ndolléhiʔ *he removed it*, nilʸlʸéhiʔ

you removed it, ndowwògŋ *she gave birth to*, koyyą́ *it rotted*.

Medial -CC- clusters with ʔ as second member are: pʔ, tʔ, kʔ, cʔ, čʔ, mʔ, nʔ, ŋʔ, lʔ, lʸʔ. Examples: ŋgopʔóho *seat*, ndoṭʔàocʔ *they brought it up again* [*old court case*], nikʔéš *his paper, book*, lacʔíŋky *leaf-cutter ants*, ndíčʔo *abnormal*, ŋgomʔą̀oʔ *moon, month*, konʔíat *they came and went away*, niŋʔèheʔ *you said* (sg.), ndolʔôʔ *they heard*, kilʸʔí *you (are) a child*.

Medial -CC- clusters with h as second member are: ph, th, kh, ḳh, ch, čh, mh, nh, ŋh, lh, lʸh. Examples: ndophé *they stole*, nothǫ̀s *my ankle*, nakhòiʔ *my skirt*, laḳhéʔ *they will use it*, ndochą̂s *they played* [*music*], ničhào *you made, did* (sg.), ŋgomhę *tortilla*, konhį́ *here*, niŋhą̀ *word*, ndolháogŋ *they bought it*, nilʸháigŋ *bird*.

Medial -CC- clusters with w as second member are: pw, tw, kw, dw, cw, sw, ʔw, hw, nw, lw. Examples: snapwép *his fear*, ndotwélk *it slit me*, cokwé *ogress*, ŋgodwí *his son, daughter*, ŋgocwés *a sore*, noswílʸʔ *I washed it* [*dish*], koʔwˆ *he came from*, lohwêoʔ *he delays*, konwę́lʔ *it became full*, kolwí *owls* (du.).

Medial -CC- clusters with y as second member are: py, ky, by, dy, gy, ʔy, hy, my, ny, ŋy, wy. Examples: nipyé *you stole* (sg.), likyèheʔ *he kneels*, tibyàoʔ *intertwined*, ŋgodyòs ŋgokwą́ŋ *court-house*, nigyòʔ *you heard* (sg.), miʔyá *all, whole*, nihyáigŋ *he remained*, limyą̀iŋ *he rolls over*, ŋgonyáʔp *his liver*, kiŋyą́ *your tongue*, niwyôk *you gave me*.

Medial -CC- clusters composed of a nasal followed by a homorganic stop or affricate are: mb, nd, ŋg, nc, nč. Examples: nambô *black*, mandą̀i *great*, riŋgì *its sap*, loncǫ̀eš *he shoves it along*, činčéǫŋ *spring of water*.

Medial -CCC- clusters with nasal as first member and ʔ as third member are: mbʔ, ndʔ, ŋgʔ, ncʔ, nčʔ. Examples: lambʔéhilʸʔ *they will dampen it*, randʔéhɛdnʔ *their money*, kaŋgʔóʔ *star*, koncʔíŋ *he jumped*, tinčʔèhegŋ *they fast*.

Medial -CCC- clusters with nasal as first member and h as third member are: mph, nth, ŋkh, nch. Examples: somphói *mud*, tanthôi *I (am) a woman*, naŋkhôikʔy *your trousers* (sg.), sonchíŋ *curls* (noun).

Medial -CCC- clusters composed of two identical consonants followed by w are: ppw, ttw, kkw, ccw, ʔʔw, hhw. Examples: wóppwigŋ (also wóppigŋ) *they gather it*, ndottwì *he finished it*, makkwà (also makkòa) *my foot*, soccwìʔ *my breasts*, noʔʔwéogŋ *I swept*, stáhhwat *my pardon* [*I receive*].

Medial -CCC- clusters with ʔ and w as second and third members, respectively, are: tʔw, kʔw, cʔw, nʔw, lʔw. Examples: nátʔwa *chayote* [*vegetable*], ndokʔwáhiʔ *they believed*, nocʔwè *my vein, artery, tendon, nerve*, wanʔwą́ŋ *her husband*, ndolʔwęheʔ *they said*.

Medial -CCC- clusters with h and w as second and third members, respectively, are: thw, khw, chw, nhw, ŋhw, lhw. Examples: rothwą́ *my corn*, ŋgokhwíčʔ *opossum*, ndochwílʸʔ *they washed it* [*dish*], konhwîʔ *your throat*, miŋhwàʔaln *we are going to arrive over there* (pl.incl.), ndolhwę́ʔet *they socked him* [*with fists*].

Medial -CCC- clusters composed of nasal plus stop plus w are: mbw, ŋgw. Examples: ndombwéhilʸʔ *he dampened it*, noŋgwą́ŋ *my bone, stick*.

Medial -CCC- clusters with y and w as second and third members, respectively, are: kyw, ʔyw, hyw. Examples: rikywą́nt *males*, kiʔywà (also kiʔwà) *your heart*, šihywáʔa (also šihwáʔa) *palm leaves*.

Medial -CCC- clusters with w and y as second and third members, respectively, are: ʔwy, hwy. Examples: noʔwyáʔat *I replaced* it, nohwyádn *I emptied it*.

Medial -CCC- clusters composed of two identical consonants followed by y are: ppy, kky, bby, ggy, ʔʔy, mmy, ŋŋy. Examples: rippyàiky *his children*, nikkyáhiʔ *you believed* (sg.), kibbyái *official position*, kíggyɛ *his hand-writing*, liʔʔyáhodnʔ *it is necessary*, čimmyóʔ *skull, phantom*, čiŋŋyǫ̀a *his nose*.

Medial -CCC- clusters with ʔ and y as second and third members, respectively, are:

t$^{\text{ʔ}}$y, k$^{\text{ʔ}}$y, m$^{\text{ʔ}}$y, n$^{\text{ʔ}}$y, ŋ$^{\text{ʔ}}$y, l$^{\text{ʔ}}$y l$^{\text{ʸ}}$$^{\text{ʔ}}$y. Examples: wat$^{\text{ʔ}}$yáhabmp *they sigh*, rik$^{\text{ʔ}}$yè$^{\text{ʔ}}$ *his clothes*, nim$^{\text{ʔ}}$yóho *they joined him*, ŋgon$^{\text{ʔ}}$yą̀ŋ *his stove, its battery*, kíŋ$^{\text{ʔ}}$yįŋ *you are sick* (sg.), nal$^{\text{ʔ}}$yą́s *scissors*, šil$^{\text{ʸ}}$$^{\text{ʔ}}$yê *medicine*.

Medial -CCC- clusters with h and y as second and third members, respectively, are: phy, thy, khy, chy, mhy, nhy, ŋhy. Examples: liphyôt *they sprout*, ndothyá$^{\text{ʔ}}$ *they emptied it*, likhyôat *lightning*, lochyá$^{\text{ʔ}}$atk *I sneeze*, ndímhyoil$^{\text{ʸ}}$$^{\text{ʔ}}$ *round*, kanhyá$^{\text{ʔ}}$ *to take a living being there*, kíŋhyǫ *why*.

Medial -CCC- clusters composed of nasal plus stop plus y are: mby, ŋgy. Examples: kimbyô *fire-crackers*, riŋgyógŋ *its blossoms, fringe*.

Medial -CCC- clusters with l$^{\text{ʸ}}$ as first member and y as third member are: l$^{\text{ʸ}}$gy, l$^{\text{ʸ}}$$^{\text{ʔ}}y, l^{\text{ʸ}}$ŋy. Examples: tel$^{\text{ʸ}}$gyá or tel$^{\text{ʸ}}$$^{\text{ʔ}}$yá *six*, tel$^{\text{ʸ}}$ŋyòhigŋ$^{\text{ʔ}}$ (also tel$^{\text{ʸ}}$ŋyǫ̀hiŋ$^{\text{ʔ}}$) *seven*.

Medial -CCC- clusters composed of two identical consonants followed by h or ʔ are: pph, tth, kkh, ķķh, ččh, tt$^{\text{ʔ}}$. Examples: copphà *bumble bee*, matthàigŋ *wild* (sg.), kakkhàdn$^{\text{ʔ}}$ *monitor* [*during Holy Week*], waķķhé$^{\text{ʔ}}$et *they defend him*, tíččhą$^{\text{ʔ}}$ont *others*, ndott$^{\text{ʔ}}$éhi$^{\text{ʔ}}$ *they removed him*.

Medial -CCC- clusters with second and third members identical are lhh, c$^{\text{ʔ}}$$^{\text{ʔ}}$, č$^{\text{ʔ}}$$^{\text{ʔ}}$. Examples: ŋgolhháiŋ *thread*, lac$^{\text{ʔ}}$$^{\text{ʔ}}$įŋky *they will jump*, lič$^{\text{ʔ}}$$^{\text{ʔ}}$įŋky *they jump*.

Medial -CCCC- clusters composed of a stop preceded by a homorganic nasal and followed by a ʔ or h, plus w or y, are: mb$^{\text{ʔ}}$w, ŋg$^{\text{ʔ}}$w, nthw, ŋkhw, ŋkhy. Examples: ndomb$^{\text{ʔ}}$wéhil$^{\text{ʸ}}$$^{\text{ʔ}}$ *they dampened it*, ndoŋg$^{\text{ʔ}}$-wę́$^{\text{ʔ}}$eš *it made it pliable*, sonthwèl$^{\text{ʔ}}$ *nettles*, ndoŋkhwào$^{\text{ʔ}}$ *they greeted him*, riŋkhyôiky *females*.

Medial -CCCC- clusters with y and w as third and fourth members, respectively, are kkyw, khyw, ŋhyw, ŋgyw. Examples: nikkywás *you did, or said, it straight*, rikhywą́ *his corn*, šiŋhywą̀p *their noses*, piŋgywą́ŋ *skeleton, bone*.

Medial -CCCC- cluster with w and y as third and fourth members, respectively, is ʔ$^{\text{ʔ}}$wy. Example: lo$^{\text{ʔ}}$$^{\text{ʔ}}$wyáhabmp *he sighs*.

Consonants appearing in word final position as -C are: p, t, k, s, š, ʔ, m, n, ŋ, l, l$^{\text{ʸ}}$, and one instance each of c and č; (but not b, d, g, f, h, r, w, y). Examples: macèp *he is cold*, khą́$^{\text{ʔ}}$at *they put them in office*, macèk *I am cold*, ndôs *your village* (sg.), ndôš *your village* (du.), lái$^{\text{ʔ}}$ *my older brother*, lik$^{\text{ʔ}}$ą̀ham *really*, mą́n *let's go* (pl.incl.), mą́ŋ *his sayings*, pastól (Span. pastor) *shepherd*, pastóil$^{\text{ʸ}}$ *shepherds* (du.), hóc *older sister* [*said by girl*], waŋgóč (Mex. Span. guangoche *gunny sack*) *bag*.

Word final -CC clusters with ʔ as second member are: k$^{\text{ʔ}}$, c$^{\text{ʔ}}$, č$^{\text{ʔ}}$, m$^{\text{ʔ}}$, n$^{\text{ʔ}}$, ŋ$^{\text{ʔ}}$, l$^{\text{ʔ}}$, l$^{\text{ʸ}}$$^{\text{ʔ}}$. Examples: macèk$^{\text{ʔ}}$ *you are cold* (sg.), mapâc$^{\text{ʔ}}$ *warm*, socclč$^{\text{ʔ}}$ *pork hunks cooked in deep fat*, tammą́m$^{\text{ʔ}}$ *we want* (dual excl.), namhǫ̀n$^{\text{ʔ}}$ *God*, nimbį́ŋ$^{\text{ʔ}}$ *down hill*, makkąhol$^{\text{ʔ}}$ *walled in*, stakéhil$^{\text{ʸ}}$$^{\text{ʔ}}$ *our belt* (dual incl.).

Final -CC clusters with ʔ as first member are: ʔp, ʔt, ʔk. Examples: kónhǫ$^{\text{ʔ}}$p *its time*, rik$^{\text{ʔ}}$yè$^{\text{ʔ}}$t *their clothes*, ŋgonyá$^{\text{ʔ}}$k *my liver*.

Final -CC clusters composed of a stop, sibilant, or lateral, followed by a homorganic nasal are: bm, pm, dn, tn, gŋ, kŋ, sn, šn, ln, l$^{\text{ʸ}}$n. Examples: lébm *always*, ronnèpm *our wells*, tohhó$^{\text{ʔ}}$odn *you are able* (pl.), tohó$^{\text{ʔ}}$otn *we are accustomed to*, kippyáigŋ *you command him* (pl.), kippyáikŋ *you command me* (pl.), nosą̂sn *we played* [*music*] (pl.incl.), kikyáhišn *you will receive* (pl.), iŋhwà$^{\text{ʔ}}$aln *we may arrive over there* (pl.incl.), skiwyá$^{\text{ʔ}}$ail$^{\text{ʸ}}$n *your curing ceremony* (pl.).

One final -CC cluster composed of stop followed by heterorganic nasal occurs: pn. kippyé$^{\text{ʔ}}$epn *you are helping him* (pl.).

Final -CC clusters composed of nasal followed by stop are: mp, nt, nk, ŋk. Examples: matwą́mp *his bravery*, khą́$^{\text{ʔ}}$ant *they grab them, arrest them*, ndotę̨nk *he stepped on me*, mandǫ̀ŋk *my elbow*.

Final -CC clusters composed of a lateral followed by a stop are: lp, lt, lk, l$^{\text{ʸ}}$p. Examples: šil$^{\text{ʸ}}$hǫ̂lp *their shirts*, pastólt *shepherds*, ndowêlk *he overtook me*, čikìl$^{\text{ʸ}}$p *corn tassel*.

Final -CC clusters composed of a sibilant fricative followed by a stop are: sp, st, sk,

šp, št, šk. Examples: ndapâsp *he is warmed up*, soŋkhwést *grand-daddy-long-legs* (pl.), kasậsk *I am a musician*, mahậišp *his height*, mbèšt *their backs*, waŋgóšk *my bag*.

Final -CC clusters composed of two stops are pt, tk. Examples: manáhapt *their strength*, manáhatk *my strength*.

Final -CC clusters composed of two nasals are: ŋn, nn, ŋŋ. Examples: kišîŋn *you will open it* (pl.), kišą́nn *you are stirring it* (pl.), piŋgywą́ŋŋ *our skeletons* (pl.incl.).

The final -CC cluster hh occurs in the one loan word waróhh (Span. brujo) *sorcerer*.

Final -CCC clusters with voiced stop as first member, homorganic nasal as second member, and either ʔ or another voiceless stop as third member are: bmʔ, dnʔ, gŋʔ, bmp, dnt, dnk, gŋk. Examples: kowwàbmʔ *we went and came back* (excl.), tandéhɛdnʔ *my money*, kombàigŋʔ *he cried*, waʔébmp *it pains him*, talódnt *chickens*, skáchadnk *my embarrassment*, wáʔʔeogŋk *he gives me* [*gift*].

Final -CCC clusters with nasal or lateral as first member, voiceless stop as second member, and ʔ as third, are: ntʔ, nkʔ, ŋkʔ, ltʔ, lʸtʔ, lkʔ. Examples: kyę̂ntʔ *step on him* (sg.imp.), matwą́nkʔ *your bravery* (sg.), mandə̀ŋkʔ *your elbow*, wàhaltʔ *horses*, koʔwéhilʸtʔ *go to sleep* (sg.imp.), ndowêlkʔ *he overtook you* (sg.).

Final -CCC clusters with sibilant fricative as first member, voiceless stop as second member, and ʔ as third, are: stʔ, štʔ, skʔ, škʔ. Examples: wadáʔostʔ *he sprinkles them*, wilʸlʸìštʔ *shine the light on it* (sg.imp.), pàskʔ *you are warm* (sg.), waŋgóškʔ *your bag*.

Final -CCC cluster composed of two stops followed by ʔ is tkʔ. Example: manáhatkʔ *your strength* (sg.)

Final -CCC clusters composed of sibilant s or š, nasal m, or a lateral as first member, with p and t as second and third members, respectively, are: spt, špt, mpt, lpt, lʸpt. Examples: nlʔòspt *their houses, village*, waŋgóšpt *their bag*, nlhǫ́mpt *their horns*, ndolhólpt *they broke their . . .* (someone else's), ndosôilʸpt *he washed their . . .* (feet, etc.).

Final -CCC clusters with ʔ as first member, and both second and third members voiceless stops are: ʔpt, ʔtk. Examples: nosáʔpt *I taught them*, cháoʔtk *they teach me*.

Final -CCC clusters with ʔ as first member, voiceless stop as second, and nasal as third, are: ʔpn (also ʔpm), ʔtn, ʔkŋ. Examples: kišáʔpn or kišáʔpm *you are teaching him* (pl.), stakéheʔtn *our belts* (excl.), raŋkhòiʔkŋ *our trousers* (pl.incl.).

Final -CCC clusters composed of sibilant fricative, lateral, or k as first member, followed by a homorganic nasal plus ʔ, have two shapes. In speech variety J (see footnote 1) the nasal precedes the ʔ except after k: snʔ, šnʔ, lnʔ, lʸnʔ, kʔŋ. In speech variety A, the ʔ precedes the nasal except after k, with free fluctuation in cluster with sibilants: sʔn/snʔ, šʔn/šnʔ, lʔn, lʸʔn, kŋʔ.[17] Examples, given in speech variety J: nosậsnʔ *we played* [*music*] (excl.), nokʔwéšnʔ *our paper, book* (excl.), stakéhelnʔ *our belt* (excl.), stawáʔailʸnʔ *our curing ceremony* (excl.), stahèikʔŋ *our fan* (excl.).

Final -CCC clusters composed of voiceless stop as first member, ʔ as second member, and nasal as third, with the order of ʔ and nasal stable for both speech varieties, are: tʔn, kʔŋ. Examples: staḳḳéʔetʔn *our defense, weapon* (excl.), raŋkhòikʔŋ *our trousers* (excl.).

Final -CCC clusters which have as third member an n omitted in speech variety J, are: kŋn, gŋn, nʔn, ŋʔn. Examples: pikyàokŋn *our foreheads* (pl.incl.), stallélhigŋn *our getting out* [*curing ceremony*] (pl.incl.), rikywą́nʔn *you men* (pl.), ndanʔíŋʔn *we got sick* (pl.incl., excl.).

Word final -CCCC clusters composed of voiced stop as first member, homorganic nasal as second, voiceless stop as third, and

[17] Informant Santa Durán (age 21) uses a set of final clusters which combines some from A and some from J: sʔn and šʔn (with the ʔn so faint it is barely recognizable), lnʔ, lʸnʔ, and kʔŋ.

ʔ or t as fourth, are: dntʔ, dnkʔ, gŋkʔ, bmpt. Examples: kawédntʔ *priests* (pl.), skáchadnkʔ *your embarassment* (sg.), wáʔ-ʔeogŋkʔ *he gives you* [*gift*], waʔàhabmpt *he asks them.*

Final -CCCC clusters composed of voiced stop as first member, homorganic nasal as second, ʔ as third, and a nasal omitted in speech variety J as fourth, are: bmʔm, dnʔn, gŋʔn, kŋʔn. Examples: ma tikkyèhebmʔm *we are going to meet each other* (du.excl.), liʔʔyáhodnʔn *it is important to you* (pl.), hyáigŋʔn *stay* (pl.imp.), iŋgyàokŋʔn *rest yourselves.*

Final -CCCC cluster composed of four voiceless stops is ʔtkʔ: kattẹ̀heʔtkʔ *you a marrier* [*bride or groom*].

Final clusters containing y have been left until last to be discussed all together. Any final cluster containing k not preceded by t, has y as its last member when it occurs following the vowels i or e. Thus, in over 99 percent of occurrences of y in a final cluster, the y is a predictable palatalization of k. In the one cluster ʔky, the y is not predictable. Clusters containing y are: ky, kʔy, ʔky, šky, ŋky, lʸky, škʔy, ŋkʔy, lʸkʔy, gŋky, gŋkʔy. Examples: šilʸháʔiky *a saw*, macèikʔy *you are cold* (dual), ličháʔky *it shines forth* [*with beams in all directions*], šikyàišky *my cracker(s)*, ndanʔíŋky *my sickness*, watténʔilʸky *it is scorching me*, šikyàiškʔy *your cracker(s)*, mandǫ̀iŋkʔy *your elbows* (of you dual), tihywàʔailʸkʔy *you will arrive over there* (dual), wahèigŋky *it blows on me*, kawéigŋkʔy *priests* (dual).

2.3. The vowel phonemes may be described as follows: four front vowels /i, e, ɛ, a/ and one back vowel /o/, with phonetic norms [i], [ɪ˅/ɛ^], [æ^], [a], and [ʊ], respectively. Of the front vowels, i is high, e is mid close, ɛ is mid open, and a is low.

All vowels may occur with a suprasegmental phoneme of nasalization, as described in **2.5.**, and are marked by /̨/ under the vowel where nasalization begins.

The vowels are found in contrast in many positions. Examples: nišši *its leaf, page*, nišše *you upset it* [*the baby, by immoral act*], nišɛ́cʔ *church*, nišša *his fresh ear of corn*, ndišò *split apart at one end*; mbbéʔi *musical instruments*, bbéʔe *they smell it*, bbéʔɛ *they lie in wait*, bbáʔadn *they call to him*, bbóʔo *they peck at it*; kadêt *wild animals*, kadêt *doctors*, kadât *some* (animate pl.), ndôt *his lice*; lihì *they are alone* (du.), lihè *he is alone*, nlhí *cane* (pl.), lhè *they sop it on* [*to tortillas*], lhé *they pick* [*cactus fruit*], lhẹ̀ *they weed*, lhà *they pick* [*chile*], lhò *they are without, do not have*; ndokhwîʔ (also ndokhwêiʔ) *they exasperated him*, ndokhwéʔ *they used it*, ŋgokhwèʔ *bean*, ŋgokhwèʔ *monkey*, ŋgokhwà *hare*; lamį̂ *there will be some*, lammè *he will lose it*, kamé *weaver*, kamá *murderer*, kamó *to give him*; macèp *his jug*, macèp *he is cold*; ką́ʔi *there are* [*heavy weight things*], ką́ʔi *they are small* (dual); čiʔį́ʔ *small* (dual), čiʔǫ́ʔ *small* (sg.), ničɛʔ *woodpecker*, nišąʔ *you fined him* (sg.), čǫ́ʔ *now*; rikhẹ̀t *their ropes, webs*, rikhẹ̀t *his hired men*, šikhyąʔ *ink, dye, paint*, tikhyǫ̀ʔt *they run.*

Free fluctuation between full phonemes occurs in a few morphemes. /a/ fluctuates freely with /e/ in the following: salhwą or selhwą *made of ground fresh-corn*, ácʔǫ or écʔǫ *your mother*, ábbɛoʔ or ébbɛoʔ *your uncle*, akkwáʔ or ekkwáʔ *your brother-in-law* [*speaking to a man*], skadá or skedá *same* [*of time and place*]. The following alternations of /e/ with /ɛ/, and /a/ with /o/ seem to represent different accepted speech varieties: kotêogŋ or kotêogŋ *puma, 'tigre'*, mahèo or mahẹ̀o *heavy*, sahép or sohwép *softly, slowly, quietly.* With some speakers /i/ fluctuates to /a/, or to /ai/, in the following prefixes, /i/ being standard pronunciation: kimbyóʔ or kambyóʔ *his burial plot, grave*, kímmyaʔa or kámmyaʔa *you should remember*, wiŋkhío or waiŋkhío *new.*

All vowels may occur with non-phonemic lengthening conditioned by tone-stress, when occurring in a syllable peak which carries falling glide /^/ or low /ˆ/ tone-

stress. In phrase final position this lengthening always occurs.

All vowels have voiceless allophones which occur optionally but commonly in normal, rapid speech. They are found only in unstressed syllables having voiceless consonants or silence as marginal elements. The vowel may be either entirely voiceless or partially voiced. As a rule the voiceless allophones are in word final syllables, as in the following examples: wattáhič? *he receives it*, ndowéhec? *he shielded another*, ŋgobéhɛ *a load*, dáhap *just, nothing but*, mmá?a *he shouts*, kócoho *he sat down*, ŋgop?óho *seat*, šilʸ?àho *advice*.

Spectrograms reveal that voiceless allophones may occur even with the phoneme of nasalization: wá?ǫ?opt *he shows them*; also in prefixes, where they may fluctuate freely to voiced: čikíl? *goat*, kochí? *snake*.

The voiceless allophone of /i/ occurs obligatorily when the dual suffix -i is affixed following the suffix -p; manǫ́pi *their lives* (du.), manáhapi *their upper-arms, their strength* (du.). In the latter, the last two syllables may occur voiceless.

The phoneme /i/ is very unstable, having a tendency to fluctuate from [i] to [ᵉi] and on to /ei/, wherever there is no /i/ in the preceding syllable of the word. The unstable condition of /i/, and the trend it is taking was demonstrated by testing out a list of words with three monolingual women of the same speech community. They were Juana Montero (J) age 35, Liboria Morales (L) age 32, and Santa Durán (S) age 21.

The list of words fell into several groups, of which samples are given here:

(1) J, L, S all [i] in manhwí? *he is going to enter*, naccì? *my tooth*; (2) J, L[i], S[ᵉi] in walí *many*, na?í *my child*, kacì *gleaner*, c?í? *they lead him*, nhį *this*, kámmį *one who has [something]*; (3) J, L[i], S[ei] in lac?ì? *they will lead him*, lanhí? *I will enter*, lo?wî? *he hiccoughs*, nohwìč? *I put on [sock or glove]*, konhį *here*; (4) J[i], L[i/ᵉi], S[ei] in ma lahí? *he will enter himself [into army]*, nhí? *he enters*; (5) J[i], L[ᵉi], S[ei] in lac?éi? *lime, calcium*; (6) J[i/ᵉi], L[ᵉi], S[ei] in kahèi? *my throat*; (7) J[ᵉi], L, S[ei] in ŋgophêi *pig*, maḳèi *fragrant*, ma?èi *chile*; (8) J, L, S all [ei] in mapèi *wild, unbaptized*, mahêi? *old witch*, bèiky *they sting me*, warèiky *burro*, chèiky *they tell me*, nakhèigŋ *grinding mill*, koméigŋ *squirrel*, laŋgèigŋ *I iron*; (I have heard koméigŋ pronounced with an [i], however.)

The examples listed thus far would seem to indicate that the age of the informant determines the degree to which her [i] is becoming [ᵉi], etc., and in general this seems to be true. The following data show, however, that in certain items of vocabulary the vowel shift is not following according to the age of the speaker.

(9) J[i/ᵉi], L[i], S[ei] in snallìč? *his light*, ma nocìč? *I'm going to render lard*; (10) J[ᵉi], L[i], S[ᵉi/i] in macì *jug*; (11) J, L[ei], S[i/ei] in chèi? *they bathe it*, kalhéiky *certain species of migrating birds*; (12) Data from S only, [i/ᵉi] in kasî? *to bathe him*, soccìč? *pork hunks cooked in deep fat*. Of course, most of the above words could be written correctly with either /i/ or /ei/, depending upon the speech variety being recorded.

The phonetic norm of the high front vowel /i/ is [i], occurring with high tone-stress in ndí??ąos *salted*, čimbíš *certain animal [related to skunk]*; with low tone-stress in šíšši *grass*, šič?ì? *teats*, nimį̀š *cat*; with glide tone-stress in rawî *my mother*, kosî *seeds*; and without tone-stress in ničhào *he became*.

As might be expected in view of the unstable condition of /i/ already described in stems, this phoneme is unstable in prefixes as well. (When /i/ constitutes the peak of a word-initial syllable, the syllable is identifiable as a prefix.) Here the instability shows itself in more or less free fluctuation, especially in closed syllables, between [i], [iˇ], [ɪ], etc, with no place to draw a line between /i/ and /e/. I am arbitrarily writing /i/ for this fluctuating vowel in prefixes, whether phonemically or morphophonemically.[18] Free fluctuation occurs in the pre-

[18] According to this interpretation, /e/ is written in 3 or 4 rare noun prefixes, but verb prefixes are written only with vowels i, a, and o.

fixes of the following: šič?é? *clay griddle*, kíčhąs *playing* music, číč?o *evil, dirty, ugly*, níč?o *it spoiled*; but in níčha *modesty* the /i/ does not seem to drop as low as [ɪ].

The following allophones have been attested by spectrographic analysis: [i^] may occur in open syllable with high tone-stress before h, and in closed syllable unstressed before k, as in kíhwa?a *you should bring*, nik?éš *his paper, book*. Lower allophone [ɪ] may occur before k in unstressed open syllable, as in kikyéhe *you will find* (sg.). [i˅] may occur before ŋ, as slight nasalization in a closed syllable before ŋ is non-contrastive in prefixes: níŋgẹhe *year*. Centralized [ɨ] may occur in unstressed syllable after r: rikhẹ̀ *his ropes*. Fluctuating [i˅/i˽] may occur in the prefix of šíšši *grass*; [iɨ] may occur in šíš *Francisca*; [i˽] may occur as peak satellite in lêi *people* (du.). In a fast, prestress syllable the vowel may occur between continuants as [i˽] or may disappear altogether, as shown by spectrograms of čiŋgêi? *parrot*, šiŋgê?ky *parrots*. No ambiguity results, as /i/ is the only vowel which may occur between č or š and ŋ in a prefix, and *čŋg or *šŋg would be unique clusters. In stressed syllable before p the allophone [i˅] occurs: mi?ìp *his enemy*.

Allophones of /i/ with distinct on-glides, [ʷi], [ᵊi], [ᴱi], occur in word-final unstressed syllables following -o?- or -oh-, -a?- or -ah-, -ɛ?- or -ɛh-, respectively, whether with or without nasalization. In very rapid speech this on-glide from the vowel of the preceding syllable may be so slight as to practically disappear. Examples: ni?ǫ̀hiŋ *he passed by*, ŋgobá?i *domesticated animal*, ŋgomɛ́hi *their load* (du.).

The phonetic norm of the mid close front vowel /e/ is a fluctuating [ɪ˅/ɛ^] as heard in ŋkhwè? *beans*, šič?é? *clay griddle*. A higher allophone [ɪ] occurs before s after y, and before š after non-contiguous /i/: gyès *just now*, kihéš *your knife*; [e^] with high or low tone-stress before š when not preceded by /i/: nahéš *his knife*, mbèšt *their backs*; [eᵊ^] with glide tone-stress when not preceded by /i/: coŋkhwêš *grand-daddy-long-legs* (du.). Allophone [e] occurs contiguous to /i/: kêi *they hunt* (du.). Lowest allophone [ɛ/ɛ˅] occurs before p in a slow syllable, not preceded by a non-contiguous /i/: ndosêp *he told him*, macèp *her jug*; but [ɪ] occurs before p when preceded by /i/: ski?èp *its smoke*. Before h and alveolars occur allophones with a rising vowel glide: [eᴵ] in mého *he lives*, mès *it is raining*. The highest allophone of all, [ɪ^ⁱ] occurs before h after a non-contiguous /i/: niwého *he lived*; lower allophone [ɛᴵ˅] after non-contiguous /a/: ma?èc? *written down* (pl.).

Spectrograms show [eᴬᴵ˅] occurring in the high tone-stressed syllable of the stem in kikyéhe *you will find*, while the final, unstressed syllable has an allophone a bit higher; [e˅] occurs in the low tone-stressed syliable of the stem in lakèhe *I, he will find*, while the final, unstressed syllable has an allophone a bit lower.

Speakers differ in the number of allophones of /e/ they employ. For example, in the following list of words some use four different allophones distinguishable to my ear, while others seem to use only two.[19] The four are: (1) [e^] mbbé?i *musical instruments*, (2) [e^>] ką́?i *there are* [*heavy weight things*], (3) [ɛ^] bbé?e *they smell it*, (4) [ɛ] mmé?i *it leaks* [*out*]. Combined, [ɛ^] is used for mbbé?i and ką́?i, [ɛ] for mmé?i and bbé?e

The phonetic norm of the mid open front vowel /ɛ/ is [æ^], as in lɛ̂ *person*, woppɛ́ *he waits for him*, ŋgonwɛ̨́ *thunder*, macèp *he is cold*. A higher allophone [ɛ] occurs contiguous to /i/ or /y/, or followed by an alveolar consonant[20]: lêi *persons* (du.), kíppyɛ *you weave* (sg.), nišɛ́c? *church*, nwɛ̨́t *thunders* (pl.). A glided allophone [ɛᵉ] occurs with

[19] Santa Durán uses only two.

[20] Note that both /ɛ/ and /e/ have an allophone [ɛ], while /e/ and /i/ have more than one allophone in common. This overlap of vowels is of the type which Daniel Jones describes as one where "the common sound belongs to one phoneme in one context and to the other phoneme in a different context." For illustrations from Northern French and Russian, see Daniel Jones, The Phoneme: Its Nature and Use, 92–96 (Cambridge, 1950).

high tone-stress before syllable-final k: woppék *he waits for me*. A centralized allophone [æ˄˃] occurs after back ḳ: ḳéʔɛ *he is small*.

The low front vowel /a/ has as its phonetic norm [a], with other principal allophones [ɑ], [æ], [ə]. Allophone [ɑ] occurs in all word-final stressed syllables, including one-syllable words; also in a penultimate syllable which is open with high or low tone-stress. Examples: kocá *pond*, skanʔå *your hand*, wài *he cries*, sámp *yesterday*, mą́ *direction*, lamáʔo *he is lazy*, mmáʔi *he stands*, and the proclitic ma *going to*. Before h there may be free fluctuation from [ɑ] to [a]: dáhap *just, nothing but*, wattáhičʔ *he receives it*, wàhaltʔ *horses*.

In word-initial stressed syllables, allophone [a] occurs if the syllable is open: wáʔǫʔop *he shows him*, láhęʔo *I pay him*; a more fronted allophone [a˂] occurs if the syllable is closed: pákkas *cow*, máʔʔa *certain herb*.

Allophone [æ] occurs primarily in unstressed syllable following y: nípbyahagɳ *his skin*, číppyaikʔy *your can* (du); (in stressed position [ɑ] follows y: miʔyá *all, whole*). A slightly lower allophone [æ˅] was recorded on the spectrogram following lʸʔ in šilʸʔàho *advice*.

In word-initial unstressed syllables a variety of allophones may occur, though the slower the speech the more they tend toward [ɑ]. Central [ə] often occurs in open syllables: maʔècʔ *written down* (pl.), kaḳéʔe *hunter*; [a] in closed syllables: lacʔéi *lime*. However, the spectrograms showed free fluctuation from [a] to [æ] in rawêbmʔ *our mother* (excl.), and in ndá *one, a*, when it is used immediately before a noun with high tone-stress and practically loses its own stress. When ndá is stressed, the allophone [ɑ] occurs.

An indistinct quality of /a/ occurs in any word-final unstressed syllable: lómmaʔa *he remembers*, ɳgowàhalʔ *horse*.

The back vowel, /o/, is articulated with lips neither noticeably rounded nor spread. When occurring without nasalization its norm is somewhere in the region of [ʊ˂,] but allophones range from [a˃] to [u], according to spectrographic analysis.[21] When occurring with nasalization the norm is approximately an [ǫ], with only slight lip rounding, having allophones ranging from [ǫ̨] to [ų˅].

In spite of a very complicated distribution of allophones, it is necessary to postulate one and only one back vowel phoneme for the following reasons: (1) no contrast has been found between [u] and [o] in perfectly analogous environments when tested with the same informant; (2) no possible place to draw a line between allophones of /o/ and */u/ has ever been found; (3) native reaction strongly supports the interpretation of all back vowel sounds as a single phoneme;[22] (4) loan words having /o/ in Spanish substitute [u] in Pame: Dyós (Span. Dios) *God*, pastól (Span. pastor) *shepherd*, tambòl (Span. tambor) *drum*, waɳgóč (Mex. Span. guangoche) *bag*; (5) the interpretation of only one back vowel works into a neater pattern of clustering with other vowels than does any other interpretation.

The allophones of /o/ vary in position according to the environment. As conditioning factors, other vowels and y take priority over the remaining consonants, and a preceding vowel has priority over a following vowel. /o/ follows phonetically (though not usually going quite as low as /a/) the height of a preceding front vowel or y, whether contiguous or in an unstressed final syllable separated from the vowel by ʔ or h.[23] Where

[21] [a˃] was recorded for the first vowel in mmóhot *they are together*. With my present informant (S), however, the vowel sounds to my ear like [ʊ˂].

[22] For example, monolingual children playing "authors" with vowel cards can distinguish "o" from "u" only by calling for "round [ʊ˂]" and "split [ʊ˂]", respectively. The best letter-writer in the tribe frequently asks if a particular Spanish word is spelled with u or with o.

[23] /o/ "in an unstressed final syllable separated from the preceding vowel by ʔ or h" is equivalent to saying /o/ "in the same stem morpheme with a preceding non-contiguous vowel".

there is no such preceding vowel, or y, /o/ anticipates the height of a following contiguous vowel other than /i/. Examples: mi?ɬok *my enemy*, nimbyò *its base*, nhèo *his sibling, cousin*, ŋgonhę́o? *his name*, pê̂ok *where*, mahào *good*, ndàoi *their eyes* (du.), ndotá?ol *he broke them off, surveyed* [*land*], *cut out* [*dress*], etc., kasé?ogŋ *runaway, eloper*, šiŋkhyǫ́n *sling-shot*, dóa *he walks*, ndotòɛhɛgŋ *he broke it*, ŋgotôe? *large* (sg.); but /o/ does not follow the height of /i/ in nôi *two*.

Where the environment of /o/ has no vowel in any of the priority positions already mentioned, consonants are the conditioning factors in the environment. The non-y consonants which tend to raise the height of a following contiguous /o/ are p, t, k, b, d, g, s, š, h; those which raise a preceding /o/ are l and w. Examples: tós *he snores*, nakkó *dove* [*small species*], bô *they give*, ndôc? *your sandals* (sg.), kaŋgò *disobedient person*, kasó *fisherman*, šót *tie it to something*, nhô *your sibling*. However, nasalization tends to lower /o/, so that some speakers have [ǫ] in watǫ̂t *dead* (pl.), hǫ̀i *he, she, it*; others have [ʊ̨] in the same words.

The consonants which tend to lower a following /o/ are m, n, ?; those which lower a preceding /o/ are p, ?. Examples: mmóhot *together* (pl.), [ǫ] with /ˈ/ in mmǫ́hi? *squashes*, [ǫ̨] with /ˆ/ in mǫ̂t *nothing*, nôi *two* (some speakers use [oʷ], others [ɔ/ɑ]), wanǫ̂t *living* (pl. adj.), ndo?ô? *he heard*, wá?ǫ?opt *he shows them*.

Clusters of identical consonants tend to raise the height of a following /o/ occurring with /ˈ/, even though the cluster be of a lowering consonant. Examples: massó *tied* [*to something*], waccó *he scolds him*, ndonnó *he neared it*.

When both a raising and a lowering factor are present in the environment of an /o/, they tend to counteract each-other, as in the following examples: [ʊ] occurs in rihyó? *calves of his legs*, (y versus ?); in l?ǎol? *they row* (a versus 1); [ǫ̨] in ŋgok?wą̀hol? *fence* (h and l versus a), and in ndohǫ̂l? *he put it heavy weight inside of*, (h and l versus /ˈ/); [oˆ] occurs in wahó?opt *he beats them down* [*on price*] (h versus ?), and in kiŋyôp *Thursday* (y versus p); [ʊˇ/uˇ] occurs freely fluctuating in nigyò? *you heard* (y versus ?).

Central allophones may occur in the environment of l, mmy, r, and c. [ʌ] occurs in the closed-syllable sequence /lol/: lólhwet *he casts them out*; and with nasalization [ʌ̨] was identified on the spectrograms occurring after mmy in rímmyǫhi? *his squashes*. [ə] may occur in unstressed syllable following r in fast speech, [o] in slow speech: rot?wè? *my clothes*. [əˆ] may occur in unstressed syllable following c in fast speech, [oˆ] in slow speech: cokwíl? *bearded* (sg. adj.). Centralized allophone [oˇ] occurs in short, fast unstressed syllables preceding high tone-stress: ndonnó *he neared it*, kochí? *snake*. [ɪˇ] occurs in a syllable following /i/ where there is no y in the intervening consonant cluster: níč?opt *it befell them*, piŋ?ò *sweet potato, tuber*, ši?òi *Pame person and language*.

2.4. Vowels occur singly in word initial, medial, and final positions. Vowels occur in clusters of two or three in a syllable. Clusters of three vowels occur in word final syllables only. Not more than one mid or low vowel occurs in any cluster.

Vowels appearing in word initial position are i, e, a. (These are limited to only four prefix morphemes.) Examples: iwyé *my braids*, iččì? (also čči?) *my teeth*, ittóc? or ettóc? *my sandals*, ittào or attào *my eyes*, éc?ǫ or ác?ǫ *your mother*, íŋhyątn *we arise* (pl. incl.), akadàhodnk? *am come to ask you for . . .*

Vowels appearing in word medial as -V- are i, e, ɛ, a, o, both with and without nasalization. Examples: nihí? *he entered*, kamê? *blacksmith*, kamét *weavers*, kamát *murderers*, komó? *gourd*, lómmįky *he has them* [*animate things*], skimę́?et *bees*, ndohwę̀c? *he lifted it up*, kąt *they live*, ŋgomǫ́hi? *squash*.

Vowels appearing in word final as -V are i, e, ɛ, a, o, both with and without nasalization. Examples: kolwí *owls* (du.), kolwé *owl*,

cokwé *ogress*, ŋgokhwà *hare*, kotô *stone*, lómmį *he has it*, nikhę *his rope*, wikhę *his hired man*, niŋhą *word*, níkkyǫ *you killed it*.

In a fast syllable (see **1.2.** for definition of FAST and SLOW syllables), the first vowel in a cluster is more prominent than the others. In a slow syllable, each vowel in a cluster has about equal prominence, except that i as last member of a cluster may be slight, [ⁱ].

All front vowels occur in cluster with the back vowel o. Clusters Vo, in order of frequency of occurrence, are ao, eo, ɛo, io. Examples: laháo? *I drink*, nlhą́o *songs*, héok? *you* (sg.), ŋgonhéo? *his name*, rabbéo? *my uncle*, nę́ok *which* (sg.), dío *it dries*.

Clusters oV, in order of frequency, are oe, oa, oi, oɛ. Examples: ndôe?t *large* (pl.), nottǫ́ehe *I put on* [*clothing*], niŋg?óahadn? *smooth*, nnǫ́a?a *he plows*, nthôi *woman*, hǫ̀i *he, she, it*, ŋgosôɛ *stamp, seal*, kottǫ́ɛ?ɛ *he spoke*.

High front vowel i occurs in cluster with all the other vowels. Clusters Vi, in order of frequency, are ai, ei, oi (listed above), and ɛi. Examples: ndo?wâič? *he threw up*, ndo?wèič? *they wrote down, put things down on* (du.), ndo?wèič? *he pieced together* [*two pieces*], ndocǫ̀ič? *they vomited* (du.), waŋgą́ič? *it wrinkles up*, ma?ˆi *done, made that way*, ma?ˆi *your two sons-in-law*, ndonǫ̀i *they saw* (du.).

Clusters iV are less common. In order of frequency they are ia, iɛ. Examples: díaha *he crawls on all fours*, konɟat *speak* (sg. imp.), pimíɛhɛ *she is pregnant*.

Clusters of three vowels occur always with i as the third member. (This i is a separate morpheme, being the dual suffix, which occurs with metathesis with any stem final consonant or consonant cluster. It is the same morpheme which occurs in some but not all Vi clusters.[24] Attested clusters are: aoi, eoi, ɛoi, ioi, aii, oai, iai, iɛi. Examples: taháoi? *we drink* (du. incl.), ndą́oi *they sing* (du.), hwèoi *my siblings* (du.), ŋgonhę́oi? *their names* (du.), rabbéoi? *my uncles* (du.), li?ìoi *they quarrel* (du.), nihyáii *they remained* (du.), dóai *they walk* (du.), niwîai *you have gone* [*and are still there*] (du.), nimɟai *they have gone* [*and are still there*] (du.), niwîei *you waited for him* (du.).

2.5. Nasalization is a suprasegmental phoneme represented by /ˈ/ under the first vowel in the word occurring unpredictably nasalized,[25] and continuing to the end of the word. Examples: lánhąt *they will arise*, (cf. lánhat *leave it alone* (sg. imp.), ŋgolhę́?ɛ *tamale* (cf. ŋgolhé?ɛ *a cold*), kamę́t *patterns of tortillas*, (cf. kamét *weavers*), nanę́ *his tongue*, (cf. naná *heron*), mą́ikt *let's go* (du. incl.), (cf. máiky *his messengers*).

Nasalization of a vowel contrasts with a sequence of vowel plus nasal consonant, as shown by the pair khą́?at *they put them in office*, khą́?ant *they grab them, arrest them*.

2.6. Significant tone falls on the same syllables as unpredictable, primary stress, forming three phonemes of tone-stress: high, marked /ˊ/, low, marked /ˋ/, and falling glide, marked /ˆ/. Tone-stress is marked over the first vowel of any vowel cluster, since that is where onset of stress begins.[26] All other syllables have predictable tone and predictable secondary stress or lack of stress, and are left unmarked.

Distribution of the tone-stress phonemes gives us, eliminating compounds and clitics, eleven main word patterns. Words of one

[24] If the alternate pronunciation of ?w iky *mosquitoes* be considered as phonemic ?ˆeiky, (according to the process described in footnote 14), this would be the only cluster of three vowels in which the third is not the dual morpheme, and it would be a unique occurrence of the cluster oei, since oe plus -i reduce by morphophonemics to oi.

[25] Slight nasalization occurs between two nasal consonants in a closed syllable, but it is noncontrastive: mancí *holy*. The phoneme of nasalization covers a stem, plus the suffix if there is one, but never the prefix: níŋgęhe *year*.

[26] Falling glide /ˆ/ is not interpreted as a cluster of /ˊ/ plus /ˋ/ for more than one reason: two chest pulses are never heard, so that /ˆ/ occurs on one phonetic and phonemic syllable; if V̂ were interpreted as /V́V̀/, /ˋ/ would no longer indicate onset of stress.

syllable occur in three patterns: ˊ, ˋ, ˆ. Examples: šót *tie it* (sg. imp.), mòt *their hips*, šôt *cloth*. Words of two syllables occur in five patterns, hyphen (-) representing in this paragraph a syllable unmarked for tone-stress: -ˊ, -ˋ, -ˆ, ˊ-, ˋ-. Examples: ndotáoi *they bought* (du.), kotàoi *their faces* (du.), kotâoi *your faces* (du.), bbáhacˀ *they collect* [*liquid*], wàhaltˀ *horses*. Predictable secondary stress, with down-gliding pitch, occurs on the second syllable of words of pattern ˊ- which have a cluster of two or more consonants separating the peak of the first syllable from the peak of the second. Examples: kónhǫˀ *sun, day*, máhhacˀ *warmed* [*by holding near fire*], kíppyąiˀ *sap, honey*. Words of three syllables occur in three patterns: -ˊ-, -ˋ-, ˊ--. Examples: tilʸˀáho *they think it over*, tilʸˀàho *they talk together*, máppaho *borrowed*. Predictable, secondary stress occurs on the second syllable of words of pattern ˊ-- having a cluster of two or more consonants separating the peak of the first syllable from the peak, of the second.

The allophones of tone-stress phonemes depend upon their distribution in the phrase. An utterance may contain one or several phrases, each one marked by a following pause, either actual or potential.

In order to describe the relative pitch of unstressed syllables and the allophones of the tone-stress phonemes, three phonetic levels of pitch must be distinguished. These will be symbolized by the raised numbers ^{1}, ^{2}, ^{3}, in order of descending pitch. Throughout the remainder of **2.6.**, tone-stress is indicated phonemically by tone marks, and phonetically by the raised numbers indicating the relative pitch of each syllable, with apostrophe (ˈ) indicating primary stress where tone-stress marks are not used.

The pitch of unstressed syllables is normally [^{3}], falling a bit lower phrase finally. Also occurring with the pitch of unstressed syllables are the slight phonetic, non-phonemic syllables, composed of word-initial nasals and/or laterals which precede stops, ˀ or h; or word-final nasals preceded by voiceless stops. Three-syllable words containing secondary stress have a step down from [^{2}] on word medial syllable to [^{3}] on word final syllable. This is somewhat parallel to the down-gliding pitch of the secondary-stressed syllable of two-syllable words. Examples: n^{3}dógŋ$^{1\text{-}2}$ *flowers*, héokˀ^{1}ŋ^{3} *you* (pl.), wà^{3}haltˀ^{3} *horses*, nó^{1}wɛ^{3}hɛ^{3} . . . *me to carry it*, ki^{3}wyá^{1}hoˀ^{3} ŋgo^{3}cìˀ^{3} *you will see his tooth*, láp^{1}pa^{2}hoˀ^{3} *I see it*, ším^{1}ba^{2}ˀot^{3} *mule*.

High tone-stress has two main allophones: [ˈ^{1}] occurring not followed by another /ˊ/ or /ˆ/ in the same phrase; and [ˈ^{2}], which often levels off in fast speech to [ˈ^{3}], occurring when followed by another /ˊ/ or /ˆ/ in the same phrase. On a syllable containing three vowels, or a word final syllable ending in a voiced stop plus nasal, [ˈ^{1}] becomes glided [ˈ$^{1\text{-}2}$]. Examples: ti^{3}šáoˀ^{1} *I learn*, ti^{3}šáoiˀ$^{1\text{-}2}$ *we learn* (du. incl.), ndol^{3}ˀá^{1}ho^{3} *they touched him*, m^{3}bé^{1} *beds*, n^{3}dócˀ^{2} wiŋ^{3}khío^{1} *his sandals are new*, wiŋ^{3}khío^{2} n^{3}dócˀ^{1} *his new sandals*, lat^{3}táogŋ$^{1\text{-}2}$ *I buy*, lat^{3}táogŋ^{2} nl^{3}hwą́^{1} *I buy corn*.

Low tone-stress has two main allophones: phrase final it is [ˈ^{3}] with a tendency to glide down a bit lower, especially on syllables containing a vowel cluster or a cluster of voiced stop plus nasal consonant; phrase medial it is an up-glide [ˈ$^{3\text{-}2}$]. Examples: ndol^{3}ˀà^{3}ho^{3} *they spoke to him*, nam^{3}bò^{3} *my hip*, ko^{3}ˀògŋ^{3} *turkey*, kat^{3}tào^{3} *my face*, lat^{3}tę̀on$^{\text{ˀ}3\text{-}2}$ koc^{3}híˀ^{1} *I'm afraid of a snake*, lat^{3}tę̀on$^{\text{ˀ}3\text{-}2}$ ŋgo^{3}cìˀ^{3} *I'm afraid of its tooth*, lap^{1}pɛ^{3} čim^{3}hyą̀^{3} *I weave a palm mat*.

Glide tone-stress has two main allophones, both of which are falling glides: [ˈ$^{1\text{-}3}$] occurring phrase final, and [ˈ$^{2\text{-}3}$] occurring phrase medial. Examples: m^{3}bˆ$^{1\text{-}3}$ *that's enough*, n^{3}dôcˀ$^{1\text{-}3}$ *your sandals*, nam^{3}bô$^{1\text{-}3}$ *black*, la^{3}ˀêogŋ$^{2\text{-}3}$ koc^{3}híˀ^{1} *I'll give it to the snake*, la^{3}ˀêogŋ$^{2\text{-}3}$ ŋgo^{3}cìˀ^{3} *I'll give him its tooth*, la^{3}ˀêogŋ$^{2\text{-}3}$ čiŋ^{3}gêiˀ$^{1\text{-}3}$ *I'll give it to the parrot*.

One must exercise care not to be confused by the intonation used in answering a ques-

tion, and hence usually employed by the informant when giving a form in response to the investigator's eliciting. The same intonation is used for naming objects in a series. It is characterized by pitch [²], and occurs as phonetic modification of the pitch of the phrase-final syllable. Phrase-final /ˊ/ occurs as [ˈ²], /ˋ/ as [ˈ³⁻²], /ˆ/ as [ˈ¹⁻²], and unstressed syllables as [²]. Examples: waŋ³góč² *bag*, ta³lógŋ² *chicken*, mam³mò³⁻² *dish*, čiŋ³gêi ʔ¹⁻² *parrot*, čib³byá¹hagŋ² *leather*, šilʸ³ʔà³ho² *advice*. Thorough study of Pame intonation has not been made.

3.0. The morphophonemic changes described in this section are those automatic ones which occur at morpheme boundaries within the word.[27]

3.1. Voiced stops are lost when occurring with the phoneme of nasalization. In fact, no sequence of *Vb, *Vd, or *Vg occurs in the language. Examples: rothwą *my corn* + -bmʔ > rothwąmʔ *our corn* (du.-pl. excl.), rothwą *my corn* + -dn > rothwąn *our corn* (pl. incl.). (Cf. taʔwà *my heart* + -bmʔ > taʔwàbmʔ *our hearts* (du.-pl. excl.), taʔwà + -dn > taʔwàdn *our hearts* (pl. incl.).)

3.2. Vowels i and o have an effect upon following consonants.

3.2.1. When an alveolar consonant t, d, c, s, n, l, occurs singly (i.e., not in a consonant cluster) preceded by a morpheme ending in i, the alveolar consonant is changed to the corresponding member of the velar-palatal series, in cluster with y if not otherwise palatal. In formula: i + t, d, c, s, n, l > iky, igy, ič, iš, iŋy (but iŋ word finally), ilʸ, respectively. Examples: ski- + -tąhanʔ *soap* > skikyąhanʔ *your* (sg.) *soap* (sg.); ki- + dóa *to walk* > kigyóa *you walk* (sg.); snakàcʔ *his wash-tub* + -i > snakàičʔ *their wash-tub* (du.) (by metathesis, see **3.4.**); ni- + -sâs *to play* [*music*] > nišâs *you played* (sg.); ki- + T >ˋ (read, tone becomes low) + -nâ *tongue* > kiŋyà *your tongue*; sandàl *soldier* + -i > sandàilʸ *soldiers* (du.).

Preceded by i, the cluster nc is changed to nč, snʔ to šnʔ. In other clusters all alveolar consonants are changed to the corresponding velar-palatal consonants. Thus, following i, nc > nč, snʔ > šnʔ, nth > ŋkhy, nd > ŋgy, dn > gŋ, dnʔ > gŋʔ, ʔt > ʔky, lʔ > lʸʔ, ch > čh, dnt > gŋky, etc. Examples: ki- + -ncáo > kinčáo *you burn yourself*; ri- + nthôi *woman* + -t > riŋkhyôiky *women*; ki- + -ndéhɛdnʔ *money* > kiŋgyéhɛdnʔ *your money*; kímmyaʔi *you stand it up* + -dn > kímmyaʔaigŋ *you* (pl.) *stand it up* (with vowel expansion, see **3.4.**); kawédnʔ *priest* + -i > kawéigŋʔ *priests* (du.); waʔéhɛʔt *she sews* + -i > waʔéhiʔky *they sew* (du.) (with contraction of vowels, see **3.4.**); ŋgowàhalʔ *horse* + -i > ŋgowàhailʸʔ *horses* (du.); ni- + -chíʔ *worm, snake* > ničhíʔ *its maggot*; rómmadnt *my jiggers* + -i > rómmaigŋky *our jiggers* (du. incl.).

3.2.2. Certain stems insert w or o after the initial consonant or consonant cluster whenever the stem is preceded by a morpheme containing the back vowel (also when preceded by either morpheme of the shape m- ~ n- ~ ŋ- ~ 0- (zero), described in **3.5.2.**). These stems will be marked with the morphophonemic symbol W placed after the stem-initial consonant or consonant cluster, and will be termed LABIALIZING STEMS. (The insertion of o is rare but may occur between an alveolar consonant and a mid or high front vowel.) Examples: non- + -cWés > noncwés *my sore*, whereas ni- + n- + cWés > ninčés *his sore* (cf. non- + -cé > noncé *my plum*); co- + -cWîʔ + Gemination > coccwîʔ *my breast*, whereas či- + -cWîʔ > čičîʔ *her breast* (cf. ŋgo- + -cîʔ > ŋgocîʔ *his tooth*); no- + -sWîlʸʔ > noswîlʸʔ *I washed it* [*dish*], whereas la- +

[27] This description is based on a study of 700 nouns (including adjectives) made by the author, and an analysis of 120 verb paradigms made by my colleague Donald Olson. All changes are covered except for those occurring when verb-object suffixes are added; no thorough study of these has yet been made.

-sWîlʸʔ > lasîlʸʔ *I wash it* (cf. no- + -sêiky > nosêiky *I told you*); no- + -thWéʔi > nothwéʔi *my willow basket*, whereas ni- + -thWéʔi > nikhyéʔi *her willow basket* (cf. no- + -théʔɛ > nothéʔɛ *my cold*); no- + -tʔWè â > notʔwèʔ *my clothing* (sg.), whereas ni- + -tʔWèʔ > nikʔyèʔ *his clothing*; ŋgo- + -dẄihigŋ > ŋgodóihigŋ *tobacco, cigarette*, whereas ni- + ṕf. (read, stress shifts to prefix) + -dẄihigŋ > níggyihigŋ *his tobacco, cigarette* (cf. ko- + -dáʔa > kodáʔa *your place to lie down*); ko- + -nhWìʔ > konhwìʔ *his throat*, whereas ka- + -hìʔ > kahèiʔ *my throat* (cf. ko- + -nhî > konhî *here*); no- + -nʔẄɕhɛʔ + T >ˈ > nonʔǫ̀ɛhɛʔ *my path*, whereas ni- + -nʔẄɕhɛʔ > niŋʔɕ́hɛʔ *your path*; ŋgo- + l- + -thWéʔi > ŋgolhwéʔi *willow basket* (cf. ŋgo- + l- + -thí > ŋgolhí *cane*) (with loss of t as explained in **3.5.3.**); n- + l- + -thWéʔi > nlhwéʔi *willow baskets* (cf. n- + l- + -thí > nlhí *cane* (pl.); ro- + -khWèʔ > rokhwèʔ *my beans*, whereas ri- + -khWèʔ > rikhyèʔ *his beans*.

3.3. Lowering and loss of certain vowels occurs before a bilabial consonant or a medial ʔ.

3.3.1. Before a bilabial consonant i > e: skiʔì *smoke* + -p > skiʔèp *its smoke*. When certain vowel clusters are followed by any suffix beginning with a bilabial consonant, loss or reduction of vowels takes place. The second member of the clusters ao, ɛo, io, eo, ei and oi[28] is lost, and the cluster ai is reduced to ɛ; then i is replaced by e before the bilabial consonant.[29] This loss and reduction occurs whether or not the vowels are followed by ʔ; the ʔ is lost before b but retained before p. Examples: kattào *my face* + -bmʔ > kattàbmʔ *our faces* (excl.); rómmɛoʔ *my chamales* [*a famine food*] + -bmʔ > rómmɛbmʔ *our chamales* (excl.); rikkʃoŋ *hulled corn* + -p > rikkɕ́mp *her hulled corn*; ro- + -ddîo *dryness* + -bmʔ > roddêbmʔ *our dryness, extreme thirst* (pl. excl.); staʔʔéogŋ *my broom* + -bmʔ > staʔʔébmʔ *our broom* (excl.); takèigŋ *my grinding stone* + -bmʔ > takèbmʔ *our grinding stone* (excl.); konhôi *my abdomen* + -bmʔ > konhôbmʔ *our abdomen* (excl.); rattòi *my grandmother, or grandchild woman speaking* + -bmʔ > rattòbmʔ *our grandmother* (excl.); naŋkhòiʔ *trousers* + -p > naŋkhòʔp *his trousers*; ŋgobái *messenger* + -pt > ŋgobɛ́pt *their messenger*; nambái *my messenger* + -bmʔ > nambɛ́bmʔ *our messenger* (excl.); nímbyąiʔ *song* + -p > nímbyɕʔp *his song*.

The cluster oa, however, remains unchanged followed by a bilabial consonant: nóddoa *my century plant* + -bmʔ > nóddoabmʔ *our century plant* (excl.).

The cluster ao in the sequence aol remains unchanged followed by a bilabial consonant: ninčáolʔ *sugar* + -p > ninčáolp *his sugar* (but rinčáoʔt *sugar* (pl.) + -p > rinčáʔp *his sugar* (pl.)).

In two-syllable stem morphemes the vowel of the second syllable always occurs unstressed and is separated from the vowel of the first syllable by either ʔ or h. Thus the vowels of the morpheme form an interrupted sequence, which we will indicate by V-V. Before a bilabial consonant, a-o > a-a, ɛ-o > ɛ-ɛ, e-o > e-e, e-i > e-e, o-i > o-o, and a-i > ɛ-ɛ. It may be noted that, in all cases but the last, the second vowel has been replaced by a vowel of the same quality as the first vowel of the interrupted sequence. A parallel exists between the loss of the second member of a vowel cluster before a bilabial consonant, and the loss of the quality, though not the occurrence, of the second vowel of an interrupted vowel sequence. That is, as far as the quality of the vowels

[28] The stem -pói *manure* is the only exception noted: ippébmʔ *our manure* (excl.) < i- + Gemination + -pói + -bmʔ; mphépt *their manure* < m- + h- + -pói + -pt. This irregularity cannot be explained by a stem alternant in any regular distribution of stem alternants, since the first person singular form, as well as the dual and plural inclusive, contain ói.

[29] Except in miʔìp *his enemy*, where some speakers have a higher vowel before -p than in skiʔèp *its smoke*. The stem is seen in miʔìok *my enemy*; miʔìo- + -p > miʔìp.

is concerned, ao > a parallels a-o > a-a; ai > ɛ parallels a-i > ɛ-ɛ, etc. Examples: staŋgàho- *ribs* + -p > staŋgàhap *his ribs*; ŋgomą́ʔo *god-parent, god-child* + -pt > ŋgomą́ʔapt *their god-parent, good-child*; ta- + -ʔéʔo *to see how it is* + -bmʔ > taʔéʔɛbmʔ *we see how it is* (excl.); nalʔèhoŋ *ox-goad* + -pt > nalʔèhempt *their ox-goad*; tolléhiʔ *I remove it* + -bmʔ > tolléhebmʔ *we remove it* (excl.); nómmǫhiʔ *my squash* + -bmʔ > nómmǫhomʔ *our squash* (excl.); ŋgobáʔi *domesticated animal* + -pt > ŋgobéʔept *their domesticated animal*; ši- + -wàhiʔ *whip* + bR (read, b replacive) + -pt > šibyèhɛʔpt *their whip*.

3.3.2. When by the addition of a suffix, a word-final ʔ becomes word-medial, a preceding contiguous i > e, ei > e: kochíʔ *snake* + -t > kocheʔky *snakes*; čiŋgêiʔ *parrot* + -t > šiŋgêʔky *parrots*.

3.4. The suffix -i, indicating dual in nouns and verbs, is the only suffix containing a vowel. The vowel suffix undergoes metathesis with any stem-final consonant or consonant cluster, except that stem-final gŋ or ŋ is lost when -i is suffixed. Examples: nothǫ̀s + -i > nothǫ̀iš *our ankle bone* (du. incl.); skamêlʔ + -i > skamêilʸʔ *leeches* (du.); snánhęʔɛn + -i > snánhęʔɛiŋ *their pet-names* (du.); talógŋ + -i > talói *chickens* (du.); snahhéogŋ + -i > snahhéoi *their* (du.) *balance scales*; nothògŋ + -i > nothòi *our saint* (du.incl.); kywą́ŋ + -i > kywą́i *men* (du.).

The only consonant suffix which -i may follow is -p. In speech variety A it follows -p, but only voicelessly: manǫ̂p *his life* + -i > manǫ̂pi *their lives* (du.). In speech variety J, dual -i precedes -p, and being a second member of a vowel cluster is lost before a bilabial (see **3.3.1**): manǫ̂p *their lives* (du.).

Contraction of vowel clusters occurs when suffix -i is added to a FAST unstressed syllable (for definition of FAST syllable, see **1.2.**) of a stem containing an interrupted sequence of identical vowels. The stem vowel in such a syllable is so reduced that it is considered lost phonemically, and is equivalent to the vowel on-glide of /i/ which occurs in a-i, ɛ-i, o-i stems. (For allophones [ᵃi], [ᵉi], [ʷi] see **2.3.**)[30] Examples: mmáʔa *he shouts* + -i > mmáʔi *they shout* (du.), (cf. mmáʔi *he stands*, where no -i has been added); ŋgoméheʔ *his hat* + -i > ŋgoméhiʔ *their* (du.) *hat(s)*; snaméʔe + -i > snaméʔi *their mesh bag* (du.); ndowéhɛ + -i > ndowéhi *they carried it off* (du.); kohwáʔa + -i > kohwáʔi *they arrived* (du.); stakʔóahadnʔ + -i > stakʔóahigŋʔ *our planes* (du.incl.); ndóhwaʔa + -i > ndóhwaʔi *they brought it* (du.); skíhyɛʔɛgŋ + -i > skíhyɛʔi *your* (du.) *hook(s)*; lóppoʔogŋ + -i > lóppoʔi *they alternate it* (du.).

The stem vowel is retained, however, in a FAST unstressed syllable when -i is suffixed to a stem containing an interrupted sequence of non-identical vowels.[31] Examples: ndowáhoʔ + -i > ndowáhoiʔ *they looked* (du.); ndóhwęʔok + -i > ndóhwęʔoiky *they paid me* (du.).

Vowels o, a, ɛ, are retained before -i in SLOW syllables (for definition see **1.2.**). Examples: lócʔo + -i > lócʔoi *they spoil it* (du.); kohwàʔal + -i > kohwàʔailʸ *they arrived* [*over there*] (du.).

[30] An alternate interpretation would be very plausible: to consider this contraction as occurring on the subphonemic level only, retaining phonemic clusters of ai, ɛi, oi, in FAST syllables. This would make a neater morphological statement for syllables containing the suffix -i; but the parallel between the interrupted vowel sequence patterns in two-syllable stems and the vowel clusters in one-syllable stems (see **3.3.1.**), plus the fact that the on-glide cannot always be detected in fast speech, seems to me to outweigh the former argument. The fact is, there is neutralization in FAST syllables between /a/ + /-i/ and the phoneme /i/ in the interrupted stem sequence a-i, etc. Phonetically [ᵃi] and [ʷi] occur alike in both cases and must be interpreted alike phonemically (no cluster of ɛi occurs in stems). Those occurrences of [ʸi] resulting from the suffixation of -i would be more easily described as phonemic /Vi/; those which occur in simple stems would be more easily described as /i/. Any single phonemic interpretation for both must necessarily be awkward at some point.

[31] One irregular stem has been observed: mého *he lives, is there* + -i > méhi *they live, are there* (du.)

Expansion of the vowel on-glide allophone of /i/ to /ai/ in the interrupted sequence a-i occurs in SLOW syllables: wómma?aigŋky *they are standing* (cf. mmá?i *he is standing*).

A cluster of two i's normally reduces to one: nthôi + -i > nthôi *women* (du.); mmá?i + -i > mmá?i *they stand* (du.). Some speakers retain the cluster aii, however, when -i is suffixed after a stressed stem peak ai: nihyáigŋ + -i > nihyáii *they remained* (du.).

The vowel e is lost before -i in a SLOW stressed syllable with some speakers; other speakers retain e in words like the following: lo?wêdn? + -i > lo?wîgŋ? or lo?wêigŋ? *they curse* (du.); lihè + -i > lihì or lihèi *they are alone* (du.). With all speakers e is lost before -i in a FAST stressed syllable: kolwé + -i > kolwí *owls* (du.).

3.5. The effect of consonants upon consonants includes regressive and progressive assimilation, metathesis, substitution, loss, and reduction of consonant clusters.

3.5.1. Regressive assimilation according to the point of articulation occurs when the suffixes -t, -p, or -pt are added to a stem having final nasal consonant or a cluster of voiced stop plus nasal. Thus, ŋ + -t > nt, gŋ + -t > dnt, n + -p > mp, dn + -p > bmp, gŋ + -pt > bmpt. Examples: ri- + kywą́ŋ *man* + -t > rikywą́nt *men*; ko?ògŋ *turkey* + -t > ko?òdnt *turkeys*; mandǫ̀ŋ *elbow* + -p > mandǫ̀p *his elbow*; skáchadn- *embarrassment* + -p > skáchabmp *his embarrassment*; ŋkhwígŋ *saliva* + -pt > ŋkhwébmpt *their saliva*.

3.5.2. Progressive assimilation occurs following the allomorphs m- ~ n- ~ ŋ- of two homophonous morphemes, (1) meaning plural absolute—i.e., plural of the unpossessed of certain nouns, and (2) meaning non-first-person possessive of the plural of certain nouns. Stem-initial voiceless stops not in cluster with h, are voiced by progressive assimilation.[32] Examples: m- + ?- + -póho *seat* > mb?óho *seats*, (but m- + -phêi + -t > mphêiky *pigs*); n- + -tógŋ > ndógŋ *flowers*, ŋ- + -kwą́ŋ > ŋgwą́ŋ *trees*, ŋ- + -k?Wéš > ŋg?wéš *papers, books*, m- + -póho > mbóho *your, his seats*, n- + -tàǫ > ndàǫ *his eyes*, ŋ- + -kwá?a > ŋgwá?a *your, his huge tamales* [*containing eggs or whole chicken*].

These morphemes have another allomorph, zero, symbolized O-, which occurs before stem-initial ?, h, n, or w. In all their allomorphs these two morphemes may be conceived of as containing a zero back vowel, since they occur with labialization of a following stem-initial consonant or consonant cluster when the stem is a labializing one (see **3.2.2.**). Examples: O- + -?Wę̂i + -t > ?wę̂iky *mosquitoes*; O- + -hWę̨? > hwę̨? *thorns*, whereas ri- + -hWę̨? > rihyę̨? *its thorns*; O- + -nèp > nèp *wells*; O- + -wàhal? + -t > wàhalt? *horses*.

3.5.3. Allomorphs ?- ~ h- ~ l- ~ t- ~ bR (read "b replacive") of the morphemes GENERALIZER in nouns, third person plural in verbs, occur affixed to stems, with the following changes in affix and stem-initial consonant(s).

The ?- and h- undergo metathesis with stem-initial consonants or consonant clusters. In cluster with ?-, stem-initial p > p?, k > k?, m > m?, c > c?, cW > c?w, nc > nc? (which, in turn, becomes nč? following i), nd > nd?. In cluster with h-, stem-initial p > ph, k > kh, kW > khw, m > mh, n > nh. Examples: ŋgo- + ?- + -póho > ŋgop?óho *seat*; šik?éhel? (stem -kéhel?) *belt*; ŋgok?wą̀-hol? (-k?Wą̀hol?) *fence*; rím?-ehept (-mého) *their homes*; nc?è?p (-cì?) *their teeth*; ŋgoc?wé?) *clay pot*; šínč?oho?-(-ncoho?) *chair*; rand?éhɛbmpt (-ndéhɛdn?) *their money*; ŋgophói (-pói) *manure* (sg.); šikhyáol? (-káol?) *hammock cradle*; ŋkhwígŋ (-kWígŋ) *saliva*; mhíoŋ (-míoŋ) *cooked stew*; nanhǫ̀a (-nǫ̀a) *a plow*; kanhą̀mpt (-nąǫ̀n) *their heads*.

Before ?- and h-, stem-initial s > c, and clusters of identical nasals, stops or sibilants in the stem reduce to one: h- + s > ch,

[32] In verbs there is an unreal-progressive aspect prefix n- which does not voice the following stem-initial voiceless stop: ntómmį *if I had*.

h- + sW > chw, ʔ- + ss > cʔ (becoming čʔ after i), h- + pp > ph, h- + mm > mh, h- + nn > nh, ʔ- + mm > mʔ, ʔ- + tt > tʔ. Examples: tacháoʔ (-sáoʔ) *they'll study*; ŋgochwì (-sWì) *piece of fire-wood*, kíčʔehigŋ (-ssWehigŋ) *food*; šíphyɛ (-ppɛ) *ribbon*, womhè (-mmè) *they lose*, šiŋhywą̀pt (-nnǫ̀a) *their noses*, wamʔǫ̀hiʔ (-mmǫ̀hiʔ) *they deny it*, šikʔę̀heʔt (-ttę̀heʔt) *marriage*.

In cluster with h-, stem-initial nd > nth, ŋgW > ŋkhW; in cluster with ʔ-, ll > ttʔ. Examples: wánthąi (-ndą̀i) *they enlarge it*, ndoŋkhwào ʔ (-ŋgWàoʔ) *they greeted him*, watt ʔéhiʔ (-llého ʔ) *they remove it*.

In cluster with l-, stem-initial h > lh, ʔ > lʔ, d > lʔ; t > lʔ if the stem contains a medial h, t > lh if the stem contains a medial ʔ or is a one-syllable stem; th > lh, tʔ > lʔ, nh > lh, nʔ > lʔ, nd > lh, ggy > lʸʔy. Examples: lalhèiky (-hèiky) *they will fan*, šilʸʔéogŋ (-ʔéogŋ) *broom*, šilʸʔyɛ̂ (-dɛ̂) *medicine*, ŋgolʔáho (-táho) *work*, ŋgolhéʔɛpt (-téʔɛ) *their necktie or donkey-bell*, ŋgolhą́o (-tą́o) *song*, lhògŋ (-tògŋ) *they guard it*, ŋgolhéʔɛ (-théʔɛ) *tamale*, ŋgolʔwèʔ (-tʔWèʔ) *clothing* (sg.), ŋgolhóʔpt (-nhóʔ) *their name*, kolʔɛ́ŋ (-nʔɛ́ŋ) *pudding*, lhą́o (-ndą́o) *they sing*, lhàičʔ (-ndàičʔ) *they like it*, kílʸʔyɛ (-ggyɛ) *letters, writing*.

In cluster with t-, stem-initial h > th, ll > tt, ww > pp, nʔ > ndʔ. Examples: šíkhywat (-hwat) *pardon*, tattè odnt (-llèogŋ) *they ride mounted*, wóppigŋ (-wwìgŋ) *they gather it*, skandʔài (-nʔài) *hand, handbreadth*.

In cluster with bR, stem-initial w > b, pp > bb. Examples: šibyéos (-wéos) *shawl*, bbéʔɛp (-ppéʔɛp) *they help him*.

3.5.4. Fricatives are substituted for the corresponding affricates before stops and nasals. In this position, c > s, č > š. (Whether a stem-final ʔ is lost, or remains with metathesis, depends upon the particular suffix and speech variety. The ʔ is lost before -k, -ky, -kʔ, -kʔy, -p, -pt, -bmʔ, -kʔŋ, and -kŋ; it remains before -t and -dn, undergoing metathesis. In verbs, ʔ remains also in the one combination čʔ + -kŋ > šʔn.) Examples: nlhócʔ + -pt > nlhóspt *their sandals*; šikyàičʔ + -k > šikyàišky *my cracker(s)*; waŋgóč + -kʔ > waŋgóškʔ *your bag*; šikkìčʔ *lamp* + -pt > šikkìšpt *their lamp*, and the pattern more common to speech variety J is snallìčʔ *his lamp* + -t > snallìštʔ *their lamp*; stallìčʔ + -dn > stallìšnʔ *our lamp* (pl.incl.); stallìčʔ + -bmʔ > stallìšnʔ or stallìšʔn *our lamp* (du.-pl. excl); snawáhacʔ *his dough dish* + -t > snawáhastʔ *their dough dish*; skiwyéhecʔ *your* (sg.) *umbrella(s)* + -dn > skiwyéhesnʔ *your* (pl.) *umbrella(s)*; stawéhecʔ *my umbrella* + -bmʔ > stawéhesnʔ or stawéhesʔn *our umbrella(s)* (du.-pl.excl.).

3.5.5. Stem-final stops (including the cluster ky) are lost before -p. The stops include stem-final ʔ only when it is in a consonant cluster. Thus, t + -p > p, ky + -pt > pt, ʔt + -pt > ʔpt, lʔ + -pt > lpt or simply lp, dnʔ + -pt > bmpt. Examples: šôt + -p > šôp *his cloth*; šilʸhèiky + -pt > šilʸhèpt *their fan(s)*; šilʸʔę̀heʔt + -pt > šilʸʔę̀heʔpt *their spurs*; šilʸhǫ̂lʔ + -pt > šilʸhǫ̂lp *their shirt*; ra- + ʔ- + -ndéhɛdnʔ + -pt > randʔéhɛbmpt *their money*.

3.5.6. The following reductions of consonant clusters occur when any suffix containing a stop and a nasal (viz., -bmʔ, -dn, -tʔn, -tn, -kʔŋ, -kŋ) is suffixed to a stem having a final consonant or consonant cluster.

The suffix stop is lost unless the stem ends in a single ʔ: t + -dn > tn; s + -dn > sn; lʸ + -dn > lʸn; lʔ + -dn > lʔn; but ʔ + -tn > ʔtn. Examples: tóppąt + -dn > tóppątn *we foretell, guess, invent* (pl.incl.); tokkwás + -dn > tokkwásn *you do it straight, right* (pl.); skiwyáʔailʸ + -dn > skiwyáʔailʸn *your curing ceremony* (pl.); tiŋgyàoʔ + -tn > tiŋgyàoʔtn *we rest* (pl.-incl.).[33] Many more examples of this loss in other combinations of consonants will be seen below, where the reduction involves other processes.

[33] The form íŋhyątn *we arise* (pl. incl.) may appear like an exception, but there is evidence for a plural alternant -nhąt of the stem -nhąs *to arise*.

The stem-final stop is lost, as well as the suffix stop, in the rare final cluster mp, and two m's reduce to one: mp + -bmʔ > mʔ, as in tonʔɛ́hɛmp + -bmʔ > tonʔɛ́hɛmʔ *we endure it* (excl.). Stem-final t is replaced by ʔ between two n's: nt + -dn > ntn > nʔn, as in rikywą́nt + -dn > rikywą́nʔn *you men.*

The suffix nasal is assimilated to the point of articulation of the stem-final consonant (except stem-final ʔ, gɳ, or ɳ): p + -tʔn > pʔm; ʔp + -kɳ > ʔpm; k + -dn > kɳ; lʔ + -bmʔ > lʔn (A) or lnʔ (J). Examples: tiɳyɛ́ʔep + -tʔn > tiɳyɛ́ʔepʔm *we appease him* (du.-pl.excl.); kišáʔp + -kɳ > kišáʔpm *you* (pl.) *teach him*; skihyèiky + −dn > skihyèikɳ *your fan* (pl.); stahǫ̂lʔ + -bmʔ > stahǫ̂lʔn or stahǫ̂lnʔ *our shirt* (du.-pl.excl.).

The reduced cluster never contains more than one ʔ. A ʔ in stem or suffix undergoes metathesis with a nasal or a cluster of voiced stop plus nasal to final position: ʔ + -dn > dnʔ; ʔ + -bmʔ > bmʔ; ǫɳ + -tʔn > ǫnʔ; įɳ + -tʔn > įɳʔ; gɳ + -kʔɳ > gɳʔ. Examples: skínčohoʔ *your chair* + -dn > skínčohodnʔ *your chair* (pl.); stáncohoʔ *my chair* + -bmʔ > stáncohobmʔ *our chair* (excl.); ti- + -hɛ̨́oŋ + -tʔn > tihɛ̨́onʔ *we are happy* (du-excl.); wá- + -nʔįɳ + -tʔn > wánʔįɳʔ *we are sick* (pl.excl.); tiggyéogɳ + -kʔɳ > tiggyéogɳʔ *you get yourselves ready.*

With a reduced cluster of fricative plus nasal, or liquid plus nasal, ʔ undergoes metathesis with the nasal in speech variety (A), while in (J) the ʔ remains in final position: s + -bmʔ > sʔn (A) or snʔ (J); š + -bmʔ > šʔn (A) or šnʔ (J); lʔ + -bmʔ > lʔn (A) or lnʔ (J); lʸ + -bmʔ > lʸʔn (A) or lʸnʔ (J). Examples: nosą̂s + -bmʔ > nosą̂sʔn or nosą̂snʔ *we played* (excl.); nokʔwéš + -bmʔ > nokʔwéšʔn or nokʔwéšnʔ *our paper, book* (excl.); stakéhelʔ + -bmʔ > stakéhelʔn or stakéhelnʔ *our belt* (excl.); stawáʔailʸ + -bmʔ > stawáʔailʸʔn or stawáʔailʸnʔ *our curing ceremony* (excl.).

A ʔ in the stem remains without metathesis, however, before a voiceless stop: ʔ + -kɳ > ʔkɳ; ʔp + -kɳ > ʔpm; ʔp + -dn > ʔpm; ʔt + -tʔn > ʔtn. Examples: nímbyąiʔ + -kɳ > nímbyąiʔkɳ *our music* (pl.incl.); kišáʔp + -kɳ > kišáʔpm *you teach him* (pl.); ta- + -sáʔp + -dn > tasáʔpm *we teach him* (pl.incl.); tikkyɛ̀heʔt + -tʔn > tikkyɛ̀heʔtn *we are married* (excl.).[34]

Before any suffix containing a ʔ, a stem-final ʔ is lost and the suffix ʔ takes a position between the voiceless stop and the nasal: p + -bmʔ > pʔm; p + -tʔn > pʔm; t + -bmʔ > tʔn; ʔ + -kʔɳ > kʔɳ; after k the speech varieties differ: k + -bmʔ > kʔɳ (J) or kɳʔ (A). Examples: konnèp + -bmʔ > konnèpʔm *our well* (excl.); tiɳyɛ́ʔep + -tʔn > tiɳyɛ́ʔepʔm *we appease him* (excl.); tokkwéʔet + -bmʔ > tokkwéʔetʔn *we defend him* (excl.); nímbyąiʔ + -kʔŋ > nímbyąikʔŋ *your* (pl.) *music*; stahèiky + -bmʔ > stahèikʔɳ or stahèikɳʔ *our fan* (excl.).

Stem-final gɳ or ɳ is assimilated to the point of articulation of the suffix (except where a preceding i prevents): ɳ + -bmʔ > mʔ; non-i Vɳ + -dn > Vn; įŋ + -tʔn > įɳʔ; non-i *V*ɳ + -tʔn > nʔ (J) or nʔn (A); gɳ + -bmʔ > bmʔ; gɳ + -dn > dn. Examples: tóttǫiɳ + -bmʔ > tóttǫemʔ *we surrender over* (excl.); staváʔaɳ + -dn > staváʔan *our ransom* (pl.incl.); wá- + -nʔįɳ + -tʔn > wánʔįɳʔ *we are sick* (pl.-excl.); ti- + -hɛ̨́oŋ + -tʔn > tihɛ̨́onʔ *we are happy* (excl.) tímhyɛ́ɳ + -tʔn > tímhyɛ̨nʔn (A) or tímhyɛ̨nʔ (J) *we play* [*a game*] (excl.); stattáogɳ + -bmʔ > stattábmʔ *our purchase*(*s*) (excl.); skikkyáogɳ + -dn > skikkyáodn *your purchase*(*s*) (pl). Where no trace of the suffix would remain, two nasals remain: igɳ + -tn > igɳn; iŋ + -tn > iɳn; ɳ + -kn > ɳn (A) or ɳɳ (J). Examples: tihyáigɳ + -tn > tihyáigɳn *we remain* (pl.incl.); ndanʔíɳ + -tn > ndanʔíɳn *we got sick* (pl.incl.); piŋgywą́ɳ + -kɳ > piŋgywą́ŋn or piŋgywą́ɳɳ *our skeletons* (pl.incl.).

[34] An irregularity of the voiceless stop being lost is observed in tiʔɛ́hiʔ + -tn > tiʔɛ̨́hiʔɳ *we call ourselves* (pl.incl.).

ARAPAHO III: ADDITIONAL TEXTS

ZDENĚK SALZMANN
NIAGARA FALLS, N. Y.

3.0. Introduction
3.1. The Woman and the Snake
3.2. The Girl and Her Brothers
3.3. White Man and His Mother-in-Law
3.4. White Man's Race with the Elks
3.5. Believe It or Not

3.0. This paper concludes the presentation of Arapaho traditional narratives.[1] Texts **3.1** through **3.4** were obtained from John B. Goggles, and the tall story **3.5** comes from Ralph Edward G. Hopper; these texts were collected using the method described in **2.0** of Arapaho Texts.[2]

3.1. 1. hísei noxsíísíyéí. 2. téécixo? čénohó?uuneníteenó? hítooθítoonínoo. 3. θowoθneníteenó? héé?ixčebíihino? héé?ihnóótoo?ee. 4. čéése? hísei héé?ix?íto?oo. 5. héé?ikóóxun hehníséhiníθ. 6. héé?ix?ite?éínee wóxuuhóóxebii níhí?ítooθíwooníθ hokóóxuno. 7. héé?ixtóúkúθee hohóótii núhú?nix?ítoohúuníθ. 8. wohéí néhé?ísei héé?ixče?notíihee hokóóxun. 9. héé?ihnonoθbii?ínee híčebéh?e?. 10. héé?ix?iténee núhú?okóóxun. 11. héé?ixče?eno?oxóhée héétoxtóúkuhuníθ. 12. héé?ixčo?óóyóokúθee núhú?okóóxun. 13. héé?ixčíinkuuθee núhú?úútoohúuníθ. 14. nohnéhé?ísei hitééxokúúton héé?ix?éneebíxčehín. 15. héé?ix?éínókun hohóótin. 16. héé?i?iibéétox néé?éétoxteesíseet. 17. nohnéhé?ísei toxteexóúhit núhú?ohóótin nohwóxuuhóóx héé?ixčiibéétoxtéí tóóyóókuun. 18. héé?ixčesííkohé? tééxokúúton. 19. héé?ixčeθikóóhun tééxokúúton. 20. héé?ihbéétoxθóókčéθéí?oo. 21. héé?ixčííní?nox?oowúsee. 22. héé?ihnoohóbee síísííyéín. 23. héé?ihné?étoxtéésóókuut. 24. nohnéhé?síísííyéí héé?ixčéθéí?oo yiisíih?i héétoxtónotíni?. 25. héé?ixčíítei néhé?síísííyéí. 26. beebéí?ón hiθóóbe? héétoxbíx?íyooní?. 27. nohnéhé?síísííyéí héé?ixθowoθneníteen. 28. héé?ix?eenetíθe? néhé?ísei. 29. héénoohiitenéθen tohóówuunonéθen tohoéésoxúunín. 30. hootniistonéθen hootniisnéniibín. 31. wohéí néhé?ísei héé?ihníísneníibee. 32. yéín čéč hé?né?nih?iičisníísnenííwoot. 33. héé?íhbeeθčiinííni? yéín héé?ihbénii?owúún. 34. wów hóótneečikóóhun heeθoohók núhú?úsein síísííyéí. 35. hehníísetí? hóótniiseineebéθn heehéxk néhé?síísííyéí. 36. yéín čéč hootnííhooθóxoníhe? héés. 37. heečét θóxonihéíninéxk híít hóótčixčé?eentóón. 38. héíto?éíno? hoowúčiixókunó?. 39. neečísee heehéxk síísííyéí. 40. néhé?ísei héé?ixčéθéí?oo. 41. héé?ixkóxtísee θoθóutéí héé?ihnoohóót níyiinóno. 42. hei?tóóθno?úseet héé?ixkóókokóhu?uutii. 43. héé?ihnéxtiitii hííyei?ínoo héé?ihnoohóbee té?iyoonóh?o héé?ix?iiníkotiiníno. 44. beeyoo héé?ihnéé?eesíseet. 45. núhú?té?iyoonóh?o? héé?ihnextííheenó? héínoonínoo. 46. néínoonínoo noo?úseet heehexkóni? té?iyoonóh?o?. 47. héé?ixčečííkóóhunó? héínoonínoo. 48. híix héé?ixčihnoúxčehín. 49. héé?ihyixkóóhuníín. 50. hísei héé?ix?oxóu?eí?oo. 51. noo?úseenoo heehéxk néhé?ísei. 52. héé?ixčečííto?óne? híix. 53. hineníteenó? héé?ihbéxsini?íθéčoonó?. 54. héé?ix?éí?towúúnee híix hót-

[1] The first portion of the narratives, Arapaho II: Texts, is to be found in IJAL 22.151–58.

[2] For an English version of **3.1**, also narrated by Goggles, see Zdeněk and Joy Salzmann, Arapaho Tales II, Midwest Folklore 2.21–42 (1952).

For variants of **3.2** see Zdeněk and Joy Salzmann, Arapaho Tales I, Hoosier Folklore 9.80–96; H. R. Voth, Arapaho Tales, JAF 25.43–50 (1912)—Nos. 5 and 13; and George A. Dorsey and Alfred L. Kroeber, Traditions of the Arapaho (Vol. V of the Anthropological Series of the Field Columbian Museum, Chicago, 1903)—Nos. 80 and 105 (pp. 152–153 and 238–239).

For variants of **3.3** see Dorsey and Kroeber, Nos. 39 and 40 (pp. 75–78).

For a similar version of **3.4** see Dorsey and Kroeber, No. 28 (pp. 61–62).

niičiiθóxonihéít. 55. hé?né?nixsíne?itííθi?. 56. nohnéhé?inén héé?ihnoníhi? héé?ix?éeθkúúθee hiníín. 57. héé?ihwoonθooxúθečoo héénoo héíhowuni(i)sihéθ heehéxk. 58. nohnéhé?ísei xoxonóú héé?ixtéení héé?ix?ísib héé?ihnií?éíɒ. 59. héé?ixkooni?éínee hiníín. 60. síísíyéí héé?ihnóónonóutóós. 61. héé?ixθí?eseí?oo héé?ixkóóko?óóθonii. 62. wohéí néhé?síísíyéí héé?ihnoutóóčéísee. 63. héé?ixčéθoočéísee héé?ix?íkóóčéísee nohbéébeet hé?né?nihi?iθoohobéít. 64. hé?né?nihi?iiθeečiiθóxonihóóθi? hinénó? híseino. 65. néé?ei?ísé? núhú?ooθítóo.

3.1. 1. The woman and the snake. 2. This is a story about an eastern tribe a long time ago. 3. The Indians were moving through thick timber. 4. One woman was behind. 5. She lost a tepee pole. 6. She caught the horse that was dragging the poles. 7. She tied this [horse] which was dragging [the poles] to a tree. 8. Now this woman went back to search for the pole. 9. She soon found it near by. 10. She picked up this pole. 11. She brought it back to where it [the horse] was tied. 12. She tied this pole back again. 13. She turned loose [the horse] which was dragging them. 14. And this woman's saddle horse was restless. 15. There was a tree lying there. 16. She wanted to get on it. 17. And this woman got on that tree and the horse didn't want to stand still. 18. The saddle horse got loose. 19. The saddle horse ran away from her. 20. She wanted to walk away. 21. She couldn't move. 22. She saw a snake. 23. She was standing right there on top of it. 24. And this snake started off toward a hole. 25. This snake went into it. 26. [It went] far down where it was dark. 27. And this snake became an Indian. 28. He talked to this woman. 29. "I'm taking you purposely because I pity you since you work so hard. 30. I will work for you and you will keep me company." 31. Now this woman was staying with him. 32. Four years she stayed with him. 33. It was in the spring four years later. 34. "Now you'll go home," said the snake to this woman. 35. "I will tell you one thing," said this snake. 36. "For four years your husband should be good to you. 37. If he mistreats you before [four years are over], you will be back here. 38. Your relatives are not far from here. 39. Go now!" said the snake. 40. This woman started off. 41. She went over the ridges and saw the tepees. 42. When she came closer, she carefully looked all around. 43. She recognized their tepee and saw the children playing. 44. She went right toward them. 45. These children recognized their mother. 46. "Our mother has returned," shouted the children. 47. They ran toward their mother. 48. Her husband came out. 49. He ran toward his wife. 50. The woman smiled. 51. "I have returned," said this woman. 52. She went to meet her husband. 53. All the people were glad. 54. She told her husband that he shouldn't mistreat her. 55. They lived up to it. 56. And [then] this man forgot it and pushed his wife. 57. He thought about it a little later; "I didn't mean to do it," he said. 58. And this woman right away looked sad, went to bed, and covered her face. 59. He uncovered his wife's face. 60. A snake was lying there coiled up. 61. It raised its head and moved its tongue in and out. 62. Now this snake crept out. 63. It crept away, went into the brush, and that's the last time it was seen. 64. That's why men shouldn't mistreat women. 65. This is the end of the story.

3.2. 1. híseihihi? nohóusóho?oho. 2. núhú?neníteenó? héénoo tooθíí niičiihéhé?ti?eenéíne?tííhoxkoní?. 3. hinéno? héé?ixsííyotikóno?. 4. híseino? noxté?iyoonóh?o? nohbéésneníteenó? héé?ihnéénino? nihnéé-θo?óóθi?. 5. té?iyoonóh?o? héé?ix?iwóówóxuuwóóhunó? héétoxθí?óókuuníí bíino. 6. čéése?íseihihi? héé?ihnéén hinéneeswox-úúnit. 7. héé?ix?íínoutii bíino. 8. hene?í?-eeθinee woxúúnoo?oot. 9. té?iyoonóh?o? héé?ixtókxóno?. 10. té?iyoonóh?o? héé?ix?-oonóókooθtókxóno?. 11. wóxuu héé?ihyei-hóni. 12. čéése? híseihihi? héé?ix?iisíténe?. 13. héé?ihnéénin hinóóhowóho? néhé?wox. 14. héé?ixtótkúúθee hikóówun. 15. núhú?-

neníteenó? héé?ihwotixtókxóno?. 16. béébeet néhé?íseihihi? nohowox héé?ix?éntoonó?. 17. wohéí néhé?wox čihnóókohóeeni heeθoohók núhú?úseihího. 18. wohéí néhé?íseihihi? héé?ihnóókohóí. 19. héé?ihno?óókohóí. 20. néhé?wox héé?ihnoohóót núhú?neč. 21. hoowunéén neibenéét hehéxk néhé?wox. 22. če?enóókohóí heeθoohók núhú?úseihího?. 23. néhé?íseihihi? héé?ixče?enóókohóí. 24. héé?ixθí?óókuu niičiihéhé?. 25. níí?ehího? héé?ix?eenetíθe?. 26. nóókóhóó neč sií?ehéítii tiitiičéi?ii heeθéihók níí?ehího?. 27. héé?ihnéé?éestoot. 28. nohnéhé?íseihihi? héé?ihno?óókohóí. 29. néhé?wox héé?ihnoohóót núhú?neč. 30. héé?ihnoohóót tiitiičéi?ii. 31. néhé?wox héé?ihbén. 32. Besée heeθoohók núhú?úseihího?. 33. néhé?íseihihi? héé?ihbesée. 34. héé?ixčix?enéitén héétox?úθetnú béxo. 35. héé?ihno?úxótii béxo. 36. néhé?wox héé?ixkokúhú?úútii béxo. 37. neihowtonóun núhú?ééniisoú?u heehéxk wox. 38. če?ísee nótiitii béxo heehéxk wox. 39. néhé?íseihihi? héé?ixče?ísee. 40. néhé?íseihihi? héé?ixčee?ín tóónhóótnístoot. 41. wó?ootó? héé?ix?itése? híisóh?oho. 42. toustóotíín heeθéihók híisóh?oho. 43. néhé?íseihihi? héé?ix?í?towúúnee híisóh?oho. 44. héé?ix?eené?ítowúúnee hééneesóóni?. 45. héé?i?e?ítowúúnee toxčee?íno? tóónóótnísooní?ii béxo. 46. hóótniitehéibéén heeθéihók híisóh?oho. 47. héé?ix?eenétenowuníno bíítéiséénookuu. 48. héé?ihbííne? nóókuhóho?. 49. nonóh?o? nóókuhéhe? hetííθoo heeθéihók?úusóh?oho. 50. čiiθóówotonéininéxk hotousnóhó?oo hiθéininéxk hiisóx čihnéé?eesčíínenot wóótíhóót nókóhut. 51. hetitó?ówoo hinííθe?ééne? nóókuhéhe?. 52. hetóókuu néhé?nóókuhéhe?. 53. hesíxoho?éxk néhé?nóókuhéhe? čééčéníítee?éxk čebítee hetí?tébi?éíhoo heeθéihók. 54. xonóu hečnoúxčehí hóótniise?énoutonóóno? wóx heeθéihók. 55. wohéí néhé?íseihihi? héé?ihno?úxotii béxo. 56. néhé?wox héé?ihnoohóót béxo. 57. nenéí?ii neitonóuyóóno heehéxk. 58. néhé?nóókuhéhe? nihnóho?o? heeθoohók wóxuu. 59. hixtous nóhó?oo heeθéihók wóxuu. 60. hiisóx né?nix?istó?owo?. 61. hih?óó heehéxk néhé?wox. 62. héé?ihwótóneenó?. 63. hóótnóókuuhúnoo nóókuhehe? heehéxk néhé?íseihihi?. 64. wohéí néhé?íseihihi? héé?ix?ókuu nóókuhóho?. 65. heičééčéniixúhuníθ néhé?wox héé?ihnó?uusí?oo. 66. néhé?íseihihi? héé?ixtébi?éíhii híí?íih?i nóókuhóho?. 67. néhé?íseihihi? héé?ihnoúxče. 68. wox héé?ixčihnoúxče. 69. héé?ixčééčébíino? núhú?onóh?oho? wóxuu. 70. héé?ihnéh?éenó?. 71. héé?ihwótóneenó?. 72. héé?ihbéeséθee. 73. héé?ihwotíθeenó? núhú?wóxuu hónoot héé?ihbeetoxúhú?úúno?. 74. néhé?wox héé?ihbísbeetíteen toséíno?. 75. hitíxonébe? héé?ihnosouníiyei. 76. héé?ix?iiθóxoohów hitíxonébe? hónoot héé?ixče?iθéénníno hitíxonówo. 77. hehníisetí? nóúteeyóó héé?ixčii?íís béététee. 78. wohéí néhé?íseihihi? héé?ihbéétox?otén núhú?úx. 79. hóótóústii heeθéihók?úusóh?oho. 80. niibéétox?iníisoo niiθítowoo. 81. hih?óó heeθéihók?úusóh?oho. 82. híténoo hetóónonítii, čiibéx?énetii heeθéihók?úusóh?oho. 83. hé?né?čeθikóóhuθí?. 84. hiisíií? héé?ixče?čó?onkóóhunó? hónoot héé?ihbíh?iyóón. 85. biikoo héé?ixtečó?onikóóhunó hónoot héé?ihnoonkonkóóhunó? héé?ihnookéni?. 86. tootóu híni?íx heeθéihók?úusóh?oho. 87. héénetíínoo heehéxk néhé?íseihihi?. 88. hóótnihikóóhunó? nosounií heehexkóni? núhú?onóh?ohó?. 89. héé?ixčeθikóóhunó? héé?ihnihikóóhunó?. 90. wow yéneihonéíno? wóx heehexkóni? núhú?onóh?oho?. 91. héé?ixčííni? wo?ownihikóóhunó?. 92. héé?ixče?notnoohóbeeno? wóxuu. 93. hiitóúk híčebéh?e? héé?ixčeikóóhun wóxuu. 94. héé?ihnoohóótowuu hiniičíθin. 95. núhú?onóh?oho? héé?ihnéínoo?óóno?. 96. hootóústóónoo heehexkóni?. 97. héé?ix?íθo?óbéétin. 98. heníxčenoo?óóno? wow heehexkóni?. 99. wohéí néhé?íseihihi? héé?ix?eenét. 100. hoo?éitóó?úsee?. 101. héé?ix?oo?éitóó?úxčehíno?. 102. tóónhóótnístoon nóxhéétoo heeθéihók. 103. čeečíís héé?ihbisénee koho?owóon. 104. héé?ix?íxčekúúθee koho?owóon. 105. nohnéhé?koho?owóo toxčíxče?čééno?oot héé?ixče?eí(í)xčeθei?ónee. 106. čéése? héé?ix?ixčíno?oo. 107. níiteiníí héé?ihnéé?éestoot hónóót héé?ihbíshiixčínoo?ooníno.

108. héé?ihnísθí?óókuu néhé?íseihihi?. 109. héé?ixčeθei?ónee koho?owóon. 110. héé?ix?-ixčínoo?oo néhé?íseihihi?. 111. néhé?wox héé?ix?ixčičéno?oo héé?ixčooníteθikúúθee. 112. néhé?wox héé?ixčexčenís. 113. béébeet héé?ihnéé?ééto néétitééheet. 114. wohéí nenééexkóni? núhú?oθó?u béénokúθi? níyiiθéíhíθi?. 115. hehnísext híní?óθo? čeeníh?i niinóóhobéíhit neneehék híní?íseihihi? nihnóotéhit.

3.2. 1. The girl and her brothers. 2. These people used to live close to water. 3. All the men were away to look for enemies. 4. The women and children and the old people were the ones who stayed [in the camp]. 5. The children were playing 'bear' where the cherry trees stood. 6. One girl pretended to be the bear. 7. She was guarding the cherries. 8. She changed into a bear. 9. The children started running. 10. The children ran scared to their homes. 11. The bear chased after them. 12. One girl got caught. 13. It was the sister of this bear. 14. It [the bear] tore her back. 15. These people ran away. 16. Only this girl and the bear were left. 17. Now this bear told the girl to bring some water. 18. Now this girl went to get some water. 19. She brought some water. 20. This bear saw the water. 21. "That's not the kind I drink," said the bear. 22. "Go back and get [another kind of] water," it said to this girl. 23. This girl went back to get some water. 24. She stood by the river. 25. A bird talked to her. 26. "Get some water [and] put moss into it," said the bird. 27. She did it. 28. And this girl brought back water. 29. This bear saw the water. 30. It saw the moss. 31. This bear took a drink. 32. "Get some wood," it told this girl. 33. This girl got wood. 34. She gathered it where the wood was good. 35. She brought the wood. 36. This bear examined the wood. 37. "I don't use this kind," said the bear. 38. "Go back to look for wood," said the bear. 39. This girl went back. 40. This girl didn't know what to do. 41. Just then her brothers arrived. 42. "What's going on?" asked her brothers. 43. This girl answered her brothers. 44. She explained what it was all about. 45. She told them she didn't know what kind of wood to get. 46. "We'll help you," said her brothers. 47. They gathered some vines. 48. They gave her a rabbit. 49. "Tell [the bear,] 'I killed the rabbit,' " said her brothers. 50. "If it doesn't believe you, if it asks you how you killed it, you put it [the rabbit] this way as if it were asleep. 51. You will hit the rabbit on its head. 52. Fry this rabbit! 53. When this rabbit gets hot and drips with grease, throw it into its [the bear's] face!" they said. 54. "Rush right out; we'll be ready for the bear," they said. 55. Now this girl got back with the wood. 56. This bear saw the wood. 57. "That's the kind I use," it said. 58. "I killed this rabbit," she said to the bear. 59. "How did you kill it?" asked the bear. 60. "I hit it this way." 61. "All right," said the bear. 62. They built a fire. 63. "I'll fry myself the rabbit," said this girl. 64. Now this girl fried the rabbit. 65. When it [the rabbit] was dripping hot, this bear closed its eyes. 66. This girl threw the rabbit into its [the bear's] face. 67. This girl rushed away. 68. The bear ran [after her]. 69. These young men shot the bear. 70. It was killed. 71. They built a fire. 72. It was big. 73. They threw this bear into the fire and it burned up. 74. The flesh of this bear burned up. 75. Its bones were still alive. 76. There was growling in his bones until his bones turned into ashes. 77. One thighbone didn't burn up. 78. Now this girl wanted to take this bone. 79. "What will you do with it?" asked her brothers. 80. "I want it to be my doll." 81. "All right," said her brothers. 82. "Take it and keep it; don't lose it!" her brothers told her. 83. They [all] left. 84. They kept running through the day until it was dark. 85. At night they were still running until it was morning and daylight. 86. "Where is the bone?" said the brothers. 87. "I lost it," said this girl. 88. "We'll have to run faster," said these young men. 89. They started off again and

ran. 90. "The bear is after us now," said the young men. 91. They couldn't run any longer. 92. They looked back to see if the bear was coming. 93. Sure enough, the bear was coming close. 94. They could see its teeth. 95. These young men were scared. 96. "What shall we do?" they said. 97. It was all level [where they were]. 98. "We're up against it now," they said. 99. Now this girl spoke up. 100. "Stand in a bunch!" 101. They did as she told them. 102. "Whatever you're going to do, do it fast!" they said. 103. Suddenly she took out a ball. 104. She threw the ball up. 105. And when this ball came back down, she kicked it up again. 106. One [of the group] went up. 107. She kept doing it until they all went up. 108. This girl was still standing [there]. 109. She kicked the ball up again. 110. This girl went up. 111. This bear jumped up but couldn't reach her. 112. This bear fell back. 113. It died on the spot from being mad. 114. Now these are the stars called 'they sit together' [Pleiades]. 115. The one star we see below [the others]—that's the girl who had the power.

3.3. 1. nih?óóθoo nohohéího. 2. nih?óóθoo tihi?iičíínooniseehék. 3. čeeséy téébe héé?-ixno?eečkóó. 4. héé?ixtéénok héé?ixčiibéésbiiθíx. 5. hiníín héé?ihnótóne? hotóústoo koohéésówoobé. 6. hííko nooxoxéhinoo tohnóóhówóú neníteenó? nootíkoníθí?. 7. néniiniiθoonóóθi? hihéíhehínoo hénéébees hótsíísíítonóóθi?. 8. toonééstóóθi néínoo hiníín heeθéihók. 9. nohnúhú? hihéího héé?ihnéénouno?. 11. héé?ixčéθei?oonó?. 12. hoho?éni? héé?-ihnóóhohúseeno?. 13. tihi?iiskóxtisééθi? híθo?owúu. 14. hóótnihi?kóóhúno? heeθoohók hihéího heetíhnóxhee no?okóóhunó?. 15. héétox nóótóó?ee? nooxéhí? néé?éétóóθi? núhú?notíkoniihíího?. 16. héé?ihnéé?eičeθikóóhúθí?. 17. héé?ihnihi?kóóhunó?. 18. héé?ihno?okóóhunó? héétoxnóótoo?eení?. 19. héé?ix?iičéééčehe?éθtiinó?. 20. héé?ixčiinúítóbeenó?. 21. tótoos héé?ixčíístéébóútee. 22. wohéí héé?ihwo?owúseenó? heetoun?óókóó?éení?. 23. nih?óóθoo nixsíniiihók nénéénéétikotííno?. 24. hootóústóónoo heeθoohók hihéího. 25. wów hehbíh?-íyoo?. 26. neniihenéhin heeθéihók hihéího. 27. hehnéétikotííno? nohheenésinééno? nih?-óóθoo heehéxk. 28. híít hootne?étox?étéiníno?. 29. wohéí héé?ihwótóneeno?. 30. héé?ix?oonókúúhúno?. 31. héé?ihbiiθíhno?. 32. nih?óóθoo héé?ihnókoonii. 33. koohonowón heeθéihók hihéího. 34. heé heehéxk nih?óóθoo. 35. henéíne nóonókhóno? heeθéihók hihéího. 36. héé?ihnóóno?óyóóhuno?. 37. héé?ix?eenéísibíno?. 38. hei?ííseenéísibíθi? nih?óóθoo héé?ix?ehéyetóú. 39. koohotóe heeθéihók hihéího. 40. hééyihnéétoxθínenoo heeθoohók hihéího. 41. núhú?-notóu heneiθíton hóóyo?sínen heeθéihók hihéího. 42. nóótnííthoowú?účiintóe heehéxk nih?óóθoo. 43. heneiniis(i)sinéno? heeθéihók hihéího. 44. héé?ix?íísíbiitónee hihéího. 45. héé?ix?e?éiténe? hihéího. 46. héé?ix?-iibéétox?iisíino?óne?. 47. nih?óóθoo héé?-ixtéítoonís. 48. héé?ihnótóne? hihéího. 49. koowów héisíino?oo heeθéihók hihéího. 50. wów héniisíinoo?óónoo béébeet hehníísetí? niičóókúú?oo? heehéxk nih?óóθoo. 51. heeyóu niičóókúú?oo? heeθéihók hihéího. 52. núhú?néínistóót niičóókúú?oo? heeθoohók hihéího. 53. hootóústóónoo heeθéihók hihéího. 54. néíhoowóe?ín nooxéhí? hootní?-néétoxθínenoo heehéxk nih?óóθoo. 55. honóókuučéín heeθéihók. 56. héé?ihnéé?éestoot nih?óóθoo. 57. héé?ix?iiní?eenébee hihéího héé?ix?iθéhin héé?ix?ííni?íhe?. 58. héé?-ixče?eečkóóhunó? tohouséétéiniθi?. 59. nihnónθo?óóno? néíhowbii?iihóóbe heehéxk nih?óóθoo. 60. néé?ei?ísé? núhú?ooθítóo.

3.3. 1. White Man and his mother-in-law. 2. White Man used to wander around. 3. [This happened] once after he just returned home. 4. He was sitting feeling sad and he didn't eat much. 5. His wife asked him, "What's the matter, are you sick?" 6. "No, I'm envious because I saw people on the warpath. 7. Each one of them is with his mother-in-law and gives her whatever he takes from his enemies." 8. "Whatever my mother decides," said his wife. 9. And this mother-in-law of his thought it was all right

[for her to go]. 10. Well, they got ready. 11. They went. 12. They went up a mountain. 13. They got over the mountain onto a plain. 14. "We will have to run," he [White Man] told his mother-in-law, "so we get there sooner. 15. There in the thick timber, I think, that's where the war party is." 16. They started to run. 17. They ran. 18. They got to the thick timber. 19. They listened around. 20. They didn't hear anything. 21. They didn't even smell smoke. 22. Now they moved over where the timber was very thick. 23. This is what White Man said: "We're tired. 24. What shall we do?" he asked his mother-in-law. 25. "It's dark now. 26. It's up to you," said his mother-in-law. 27. "We're very tired and hungry," said White Man. 28. "We'll camp right here!" 29. Now they built a fire. 30. They fried [meat]. 31. They ate. 32. White Man yawned. 33. "Are you sleepy?" his mother-in-law asked him. 34. "Yes," said White Man. 35. "We should go to sleep," said his mother-in-law. 36. They fixed their beds. 37. They went to bed. 38. After they had gone to bed, White Man's teeth chattered from the cold. 39. "Are you cold?" his mother-in-law asked. 40. "I'm dying from cold," he told his mother-in-law. 41. "Use this blanket of mine to cover yourself," his mother-in-law told him. 42. "That won't stop my being cold," said White Man. 43. "Should we sleep together?" said his mother-in-law. 44. He crawled into bed with his mother-in-law. 45. His mother-in-law put her arms around him. 46. She wanted to warm him up. 47. White Man lay still. 48. His mother-in-law asked him: 49. "Are you warm now?" said his mother-in-law. 50. "I'm warm, but one thing hasn't warmed up yet," said White Man. 51. "What is it that hasn't warmed up?" asked his mother-in-law. 52. "This thing of mine hasn't warmed up yet," he said to his mother-in-law. 53. "What can we do about it?" asked his mother-in-law. 54. "I don't know; maybe I'll die from it," said White Man. 55. "Warm it up," she said. 56. White Man did it. 57. He liked his mother-in-law because she was pretty and treated him kindly. 58. After they stayed overnight, they went back home. 59. "We got lost; we didn't find them," said White Man. 60. This is the end of the story.

3.4. 1. nih?óóθoo héé?ixčebísee. 2. héé?i?-itésee wóxuuhuu. 3. héé?ix?eenetíθee wóxuuhuu. 4. wóxuuhuu hóótnonuxtííbéén heeθéihók. 5. hoowúuni héése?óónee heeθoohók. 6. nihnuíítóbééno? tohéso?ooninékx. 7. neneenínee wóxuuhuu yeneyó?oxtéénee. 8. nenééninóó neniisó?oxtéénoo. 9. nenééninóó hóótnítо?čésixč(e)hénoo. 10. hih?óó heeθéíhók wóxuuhuu. 11. wóxuuhuu héé?i?iis?-énoúno?. 12. nih?óóθoo héé?i?nítóbeekuu. 13. yéín hóótnítíhinoo. 14. nih?óóθoo héé?-ihneyéítii. 15. čéésey níís néése yéín wóóhéy heehéxk nih?óóθoo. 16. héé?ixčésixč(e)héno?. 17. nih?óóθoo héé?ihniiθkóóhúúbee wóxuuhuu. 18. héé?ix?e?ín héé?ixčo?ouuténin hoxotóóno?. 19. héí?noúxčehíθi? héé?ihnítóú no?ósixčehi? heehéxk. 20. wóxuuhuu héé?ixčenísno? xotoonúu. 21. nih?óóθoo héé?ihnoo?óóhoe wóxuuhuu. 22. ?oohóó nenéxtoníhnoo heehéxk nih?óóθoo. 23. nih?-óóθoo hóótbiiθihnoo heehéxk. 24. wohéí nih?óóθoo héé?ixčenítheit. 25. wohéí koo?-ohowúhu? héé?ixčí?tése? héé?ixčii?íh. 26. nih?óóθoo héé?ihnihííθee koo?-ohowúhu?. 27. činóók(o)hóeeni heeθoohók koo?ohowúhu?. 28. hih?óó heehéxk koo?-ohowúhu?. 29. nóótousnóót neč heehéxk koo?ohowúhu?. 30. hóótko?úxowoo hóótní?-nóókohóyeit. 31. héé?ixko?úx hinís héé?-ihbíínee koo?ohowúhu?. 32. wohéí koo?-ohowúhu? héé?ihnóókohóí. 33. koo?ohowúhu? héé?ix?ésinee. 34. héé?ihótoowkúútii híni?hí?nóókohóyeit. 35. koo?ohowúhu? héé?ixčiino?óókohóí. 36. héé?ihbéestéhé?éí. 37. nih?óóθoo héé?ix?ee?ín koo?ohowúhu? toh?ótoowkúútiit. 38. nih?óóθoo héé?ix?-etíθee koo?ohowúhu?. 39. héé?i?tó?óbe koo?ohowúhu? héé?ixnóxowúhuu. 40. héé?-ixniihenbén nih?óóθoo. 41. nih?óóθoo héé?-ihbéeθčeníhei. 42. héé?ix?oonóutii hoséíno?. 43. nih?óóθoo héé?ixnéétoxúun. 44. héé?-ihné?ebíh?íyoo. 45. nih?óóθoo héé?ihnóko.

46. koo?ohowúhu? héé?ixče?θówoθii héé?-ihnítóú. 47. héé?ih?etíθee hóoxéíhíno nohwóxuu nohbexóókeenó. 48. héé?ixtoyoohóbeenó? nih?óóθoo héí?inih?ineenóko. 49. čese?ehíího? héé?ix?etíθeenó? hookúúhúho. 50. héé?ihyííθečnéíhiinó? héétoxnókóhuníθ nih?óóθoo. 51. nih?óóθoo héé?ihnih?ineenóko. 52. čese?ehíího? héé?ihniyííθeeno? hookúúhúhó θiiyúhún nih?óóθoo heeθéihók. 53. wohéí čese?ehíího? héé?ihbííθhino? hoséíno? hónóót héé?ix?otóóbenó?. 54. nih?-óóθoo toho?owóto?oot. 55. héé?ixnotnoohóót hoséíno?. 56. héé?ixčiinoohóót hoséíno?. 57. héé?ixčiinííθe?één héé?ixθiiyúhu? hookúúhúho. 58. héé?ixčínííθečoo. 59. kookoyóné wótóne. 60. héé?ihwóowó?otén niinénii. 61. héé?ixčeenók tóóθííh?i síte?. 62. héé?ixče?eín niinénii. 63. sítee héé?ixko?étee héé?ixko?osénin hičóóbe?. 64. héé?ih?otóhu? ?o?ohó heehéxk nih?óóθoo. 65. héé?ihwótiskóuskúútii niinénii. 66. héé?ixčiibiiθíh. 67. néé?ei?ísé? hooθítóo.

3.4. 1. White Man was walking. 2. He came to some elks. 3. He talked to the elks. 4. The elks said, "We want to race you." 5. "Nothing doing; you're too fast for me," he told them. 6. "We heard that you were a fast runner." 7. "You elks, you have four legs. 8. I have two legs. 9. I want a head start." 10. "All right," the elks told him. 11. The elks were ready [to race]. 12. White Man stood in the lead. 13. "I'm going to count to 'four.'" 14. White Man counted. 15. "One, two, three, four—go!" said White Man. 16. They took off. 17. White Man was running right with the elks. 18. He knew that there was a cliff [ahead]. 19. When they came to it, he shouted; "Close your eyes!" he said. 20. The elks went over the cliff. 21. White Man killed the elks. 22. "Oho, I'm smart," said White Man. 23. "I'm going to eat," said White Man. 24. Well, White Man was butchering. 25. Now, a lame coyote came up to him. 26. White Man ordered the coyote: 27. "Get me some water!" he said to the coyote. 28. "All right," said the coyote. 29. "How am I going to get water?" asked the coyote. 30 "I'm going to cut something to get water with." 31. He cut out a sac [from around an elk's heart] and gave it to the coyote. 32. Well, the coyote went to get some water. 33. The coyote was hungry. 34. He ate it up—the thing he went to get water with. 35. The coyote came back without water. 36. He had a big stomach. 37. White Man knew that the coyote ate it [the sac] up. 38. White Man ordered the coyote to come close. 39. When he struck the coyote and knocked him out. 40. White Man went to get water. 41. White Man was all through butchering. 42. He hung up the meat. 43. White Man was tired. 44. It was getting dark. 45. White Man was asleep. 46. The coyote got up howling. 47. He called wolves and bears and tigers. 48. They waited until White Man slept soundly. 49. The animals called a mouse. 50. They sent it over to where White Man slept. 51. White Man slept soundly. 52. The animals gave an order to the mouse. "Cut White Man's hair," they told it. 53. Now, the animals were eating meat until they finished it. 54. White Man woke up. 55. He looked around for meat. 56. He didn't see any meat. 57. He had no hair because it had been cut off by the mouse. 58. He was sad. 59. Without any reason, he made a fire. 60. He gathered fat pieces. 61. He sat down by the fire. 62. He had the fat pieces on his lap. 63. A spark jumped up and landed on his thigh. 64. He got burned; "Ouch!" said White Man. 65. He spilled the fat pieces on the fire. 66. He had nothing to eat. 67. This is the end of the story.

3.5. 1. híθoowotóó wo?éíθ čiibéx?íθoowotóó. 2. héé?i?íítoníče?oút hóhe?e?. 3. honóh?e héé?i?iibéétooxuučéno?oot. 4. héé?-ixčiixóótee kokónóó hé?né?čéno?oot. 5. θooθoonííhi? hé?né?nix?í?o?oot. 6. hé?né?-če?eíneečéno?oot.

3.5. 1. Believe it or not. 2. There was a high mountain on both sides [of a gorge]. 3. A man wanted to jump across [the gorge]. 4. They [the cliffs] were far apart, but he jumped. 5. He went as far as the middle. 6. Then he turned around and jumped back.

NOTES AND REVIEWS

Comparison of Linguistic Systems

H. A. Gleason, Jr.

Linguistic systems are abstracted from the data by analysis. As published, their form is controlled by two groups of factors: the observable linguistic events, and the methods of analysis used. The comparison of linguistic systems is necessarily performed by the comparison of statements of the systems. There is, therefore, always a danger that when one seeks to compare languages, one is in fact comparing analytic methods. The latter is, of course, a valid activity when properly labeled. Indeed, careful comparison of analytic methods is a necessary prerequisite to acceptable comparison of systems.

Nathan Altshuler in a recent paper[1] presents certain cross-cultural and cross-language comparisons to test a hypothesis correlating certain features of gross language structure with certain features of gross social structure. As this hypothesis may attract some discussion, it is worthwhile to examine closely his handling of linguistic comparisons. This is certainly true with one of his cases, Chewa and Zulu, since these languages are largely unknown to some readers of this journal.

Altshuler's hypothesis leads him to expect 'that the Zulu will show noun enhancement/verb decrement as compared to the Chewa.'[2] It is not the purpose of this note to examine either the hypothesis or the validity of the language typology implied in his terms 'noun enhancement', 'verb decrement', etc. The question is raised merely as to what Altshuler has, in fact, compared. I submit that this is not actually Zulu and Chewa at all, but the analytic methods of the two linguists Clement M. Doke and Mark Hanna Watkins.[3] This can be shown by the fact that application of the method used in one paper to the corpus of the other removes most or all of the differences on which Altshuler rests his case.

The basic support is adduced from the assertion that the prefixes are missing in certain Chewa noun forms, whereas every class of Zulu nouns does have a prefix in both singular and plural. Each of the Chewa noun classes (Watkins' classes 3, 4, and 5) cited must be examined.

Class 5 singular and plural are alike in Chewa. Watkins, therefore, does not find any need to analyse the forms as having a stem and a prefix. He does note that most begin with nasals. Doke's method would segment off the nasal element as a prefix, the prefixes being alike for singular and plural. Doke does just this in a number of comparable cases in various Bantu languages.

Watkins treats his class 3 as having no prefix in the singular, ma- in the plural. He says:

> After a plural prefix, the following modifications in the initial consonant of the stem frequently occur: An aspirated consonant in most cases becomes unaspirated; *ts* in most cases becomes *s*; *pf* always becomes *f*; *dz* frequently becomes *z*; *dz* is frequently lost, sometimes leaving a *y*- or *w*-glide between the vowel *a* of the prefix and the stem vowel; *b* frequently becomes *β*; in one case *b* is lost; in one instance *g* becomes *k*; in one instance a 'nasal attack' consonant changes to a plain stop.[4]

By Doke's method this would be treated quite otherwise. The stem would be found

[1] Nathan Altshuler, Linguistic Forms as Symbols of People, IJAL 22.106–112 (1956). This note concerns section 4 only.

[2] Ibid., p. 110.

[3] The comparisons in this note of the method used by these two authors are not to be taken as evaluations of either. They wrote within different frameworks for different purposes and address their grammars to different publics. The descriptions of the methods are not necessarily in the terminologies used by the authors.

[4] Mark Hanna Watkins, A Grammar of Chichewa, Language Dissertations, no. 24, p. 31 (1937).

by removing the prefix ma- from the plural. The change in the stem initial in the singular would be considered as the actualization of a prefix. That Doke would in fact do so is shown by his treatment of similar cases in a number of languages. In Shona, e.g., he lists this prefix as (i)[ri-], the Brackets [ ] meaning that it is never actualized in this form. He says in part 'a voicing of the initial consonant of the stem takes the place of the prefix ri- . . . '[5]

The third instance is Watkins' class 4, of which he says: 'Nouns of this class begin with the vowel *u* or the bilabial stop (explosive) *b*, but these do not have the function of prefixes, at least as regards number. They probably represent a worn-down prefix, *ubu-*.'[6] Again, Doke's method would treat this u or b as a prefix, partially on historical grounds, but also on descriptive grounds. The presence of this element is too frequent to be disregarded. It must be mentioned—Watkins elects to note a similarity in stems, Doke would label this similarity a prefix.

The preceding three paragraphs will demonstrate that if Doke had described Chewa, the language would have seemed essentially as 'noun enhancing' as Zulu. What if Zulu were described by Watkins' method? Here we can be less certain, since Watkins has not applied his method to the large number of Bantu languages on which Doke has written, nor has he stated it as explicitly. Moreover, Watkins might, if he were to describe Zulu, modify his method. By Watkins' method, therefore we can mean nothing beyond what he uses in his treatment of Chewa. We may restrict our attention to one case.

In Doke's class 5 the prefixes are im- singular and izim- plural as seen in imbuzi *goat* and izimbuzi *goats*. In his treatment of class 4, Watkins takes as a prefix only that part of the forms in which a contrast is seen between the singular and the plural. In the Zulu forms just cited this analogy would certainly apply. The only prefix that can be analysed from these forms in this class is iz- plural. The stem must be imbuzi. The singular is, therefore, without a prefix.

Actually, Altshuler did not cite the best case of a noun form without a prefix in Chewa. That is the singular of Watkins' class 1a. There is commonly no prefix in this class in Bantu languages, though in some cases an analysis in terms of a zero prefix (to be distinguished from a 'missing' prefix) seems to have much to commend it. There is a class 1a prefix u- in Zulu, though not in all Nguni dialects.

Altshuler also seems to advance in evidence Watkins' finding that 'we cannot regard the prefix, or its absence, as the sole or primary determinant of the class system. It is rather the whole system of concordances . . . that must be taken as the fundamental basis of classification.'[7] This is quite true, but it is equally true of Zulu. Doke does not happen to say it as bluntly as this in his Zulu Grammar. But notice: 'These nouns [Class 1a] form a sub-class to Class 1, because, while the noun prefixes are different, the concords throughout are the same as for Class 1.'[8] The concords are given priority before the prefixes. Doke actually classifies in the same way as Watkins. The difference here, far from being a difference between languages, is not even between two methods, but in what one says explicitly, and the other more implicitly.

The number of 'missing' prefixes is partly dependent on the analytic method used. By the proper selection of method it can be made to be more in Chewa than any method will make it in Zulu, but the difference cannot be made to be as great as

[5] Clement M. Doke, The Southern Bantu Languages, Handbook of African Languages, p. 208 (1954). Cf. also the table of prefixes on p. 209.

[6] Watkins, op. cit., p. 33.

[7] Ibid., p. 22–23.

[8] Clement M. Doke, Text-Book of Zulu Grammar, Third Edition, p. 43 (Johannesburg, 1941). Altshuler does not cite this work, though it is certainly the fundamental treatment of Zulu grammar and the major typification of Doke's method.

Altshuler considers it. But does this mean that there is any difference in the fundamental nature of the concord system? Altshuler would seem to imply that the verbal concord prefixes determine the concord in Chewa. This seems clearly contradicted by everything in the structure and certainly unwarranted by Watkin's description. The Chewa noun controls the concord. In one instance (class 1a singular) the class is covert in the noun. In three other instances it is partially covert (marked by features of debatable status, either prefixes or stem peculiarities). Watkins did his best to make clear the fundamental structural similarity of Chewa and Zulu. He says: 'In morphology, the Chewa language conforms quite rigidly to the general Bantu pattern,' and 'The general structure of the Bantu languages is too well known to require any further comment here, and in no feature does Chichewa show important deviations.'[9] Either of these statements should serve as a warning to anyone who seeks fundamental structural contrasts from a superficial reading of the grammar in which they occur.

Altshuler seems to have read neither Watkins nor Doke with care. He certainly failed completely in the first requisite to any comparative job, that of adjusting the two descriptions to a comparable basis. He claims: 'Speaking, then, only for the Chewa-Zulu material, our hypothesis received support from the evidence.' We must deny this claim on the grounds that Altshuler has, apparently, not as yet examined the evidence. What will appear when the evidence is examined, we do not know.

HARTFORD SEMINARY FOUNDATION AND DECCAN COLLEGE

SPANISH HURACÁN AND ITS CONGENERS

DOUGLAS TAYLOR

A number of people have speculated about the provenance and etymology of Sp. huracán, Fr. ouragan, Eng. hurricane. Three hundred years ago, in his Island-Carib dictionary, Raymond Breton wrote under the entry 'iouállou': 'Les François l'appellent ouragan, & l'ont peut-estre pris des Grecs, chez lesquels il signifie un tourbillon, . . .' Today, most people recognize that it was borrowed, in the form [hurakán], from the native Indians of Haiti, whose language is generally classified as belonging to the Arawakan family—or stock—of languages; yet modern dictionaries continue to print such comments as 'of Carib origin' (COD), and 'orig. caraïbe' (PLI). Paul Radin sees in this word the name of 'an Arawakan Taino god' (Indians of South America, p. 9); Adrian Recinos a word borrowed by the Haitians from Maya 'Huracán *a leg*; Caculhá Huracán *flash of a leg or the lightning*' (Popul Vuh, pp. 82–83, fn. 7); while C. H. de Goeje contents himself with some rather implausible comparisons, and comments: "Je n'ai pas trouvé de justification pour l'opinion de quelques savants qu'il y aurait un rapport entre T hurakan *ouragan* et Maya Hurakan, un nom du dieu 'Coeur du Ciel' " (p. 12 of his Nouvel examen des langues des Antilles, in JSAP XXXI, pp. 1–120).

People do not usually borrow words to name the natural phenomena of their homeland; and a more prosaic explanation than that of Radin is at least possible. But if the word is Arawakan, we should expect to find cognate or related forms in other languages of the same stock; although these need not necessarily have the same meaning, especially since most of South America, where other Arawakan languages still are spoken, lies outside the hurricane zone. For comparison, de Goeje himself offers: Achagua kauri *storm*, Island Carib uli *black*, ariabu *night*, and Lokono (True Arawak) origahu *night*; none of which seems—to me at least—at all cogent. I am surprised that his own recording of the Lokono word kulakani *thunder* did not occur to him as a possible cognate of Taino hurakán. Already in 1629, Vázquez de Espinosa had recorded curacale *trueno* from the Arawak of Trinidad; and about the

[9] Watkins, op. cit., p. 19. The two sentences are from different paragraphs.

middle of the nineteenth century Brett recorded akorakali *thunder* from the coastal Arawak of British Guiana. Moreover, these words can hardly be unrelated to Raymond Breton's acoullácani *tintamarre, tabouremment*, recorded from the Indians of Dominica toward the middle of the XVIIth century.

However, in this same work (Dictionaire Caraibe-François and Dictionaire François-Caraibe, Auxerre, 1665 & 1666), we find other forms which may plausibly be related to Taino hurakán, such as ahoullacha *arracher*, whose base, houlla, also occurs as a free form, and oúra-okáali, variously translated as *il vente bien fort, il souffle bien, la pluie est accompagnée de vent*, whose base, oura is also free. These two bases, whether historically related or not, have been merged in that dialect of Island Carib spoken today by the Black Carib of Central America; in which we find a verb áhuraha *to blow off, to snatch away, to weed*, and whose free base, húra, is employed as in húra lumúti gię garábali nubúnidų *the wind also blew off my hat*. A large class of Island Carib verbs is formed in this way—by prefixing a- and suffixing -Ca to a base which is formally a particle (or, rarely, a noun), but which bears the lexical meaning. And from such verbs verbal nouns may then be formed by suffixing -ni, as in the case of Breton's acoullácani (see above). Another type of construction is seen in Breton's oúra-okáali, which is, despite the hyphen, one word containing a generalizing suffix, -oka, denoting that a general phenomenon (such as the weather) is referred to, and a perfective verbalizing suffix, -ali. If now the latter be replaced by nominalizing -ni, it is clear that the resultant form in the Dominican dialect (which Breton might have written *oúra-okáani), or in that of the modern Black Carib (which I would write *húraugàni), would have a meaning almost exactly equivalent to our *gale* or *hurricane*. That these particular constructions are not attested may be accidental, or due to the fact that other words were and are used by these people to designate what we call a hurricane; but the type of formation (particle + generalizing -(u)ga + nominalizing -ni) is perfectly regular, and can be illustrated by many concrete examples from either dialect.

DOMINICA, B. W. I.

LANGUAGE, THOUGHT, AND REALITY: SELECTED WRITINGS OF BENJAMIN LEE WHORF. Edited by John B. Carroll. Cambridge and New York: The Technology Press of the Massachusetts Institute of Technology and John Wiley and Sons, Inc., 1956. x plus 278 pp.

JOHN T. WATERMAN

With his edition of Language, Thought, and Reality, Professor Carroll has again performed an invaluable service for linguists everywhere. Although the Foreign Service Institute's Collected Papers on Metalinguistics and reprintings in various professional journals have made several of Whorf's articles fairly accessible, certain important information has been generally unavailable until the appearance of this volume. From the standpoint of sheer convenience, if for no other reason, the printing of this material in book form is both justified and desirable. However, Language, Thought, and Reality is much more than a convenient collection of Whorfiana; it is in fact a carefully planned and skillfully edited presentation of Whorf's philosophy of language, to which has been added an interesting foreword by Stuart Chase, an invaluable essay by Carroll, and an extremely illuminating and useful bibliography containing a full listing of Whorf's publications (and subsequent reprintings), a partial cataloguing of his unpublished manuscripts, and a selected list of books and articles relating to his writings.

The table of contents lists the following articles: On the connection of ideas; On psychology; A central Mexican inscription combining Mexican and Maya day signs;

The punctual and segmentative aspects of verbs in Hopi; An American Indian model of the universe; A linguistic consideration of thinking in primitive communities; Grammatical categories; Discussion of Hopi linguistics; Some verbal categories of Hopi; Language: plan and conception of arrangement; The relation of habitual thought and behavior to language; Gestalt technique of stem composition in Shawnee; Decipherment of the linguistic portion of the Maya hieroglyphs; Linguistic factors in the terminology of Hopi architecture; Science and linguistics; Linguistics as an exact science; Language and logic; Language, mind, and reality. Of these, the following appear in print for the first time: On the connection of ideas; A linguistic consideration of thinking in primitive communities; Discussion of Hopi linguistics; Language: plan and conception of arrangement. As far as dates of composition are known or can be approximately determined, the items are arranged in chronological sequence. The bibliography, incidentally, has a special column for 'date of composition,' a very desirable entry, since several of Whorf's articles either appeared posthumously or at least several years after he had written them.

Before going on to the body of this review, may I mention in passing those compositions that are devoted to Middle American paleontology and archeology, subjects which quite exceed my competency and which I therefore cannot comment upon. Carroll includes them because he feels that Whorf's studies in these two areas deserve wider recognition and because they so well present his 'notions about the problem [of the interpretation of Maya hieroglyphs] and about writing systems in general' (31). I should also like to be excused from dwelling at any length on those titles that have in recent years been severally reprinted and which on more than one occasion have already received editorial attention.

Because Whorf always enjoyed the protective immunity of the non-professional, he could afford to be casual about some of the more onerous details of scholarship. For this reason no one outside the small number of linguists who knew him personally could say just which scholars (other than Sapir) or what books or what ideas had been most influential in shaping what is now referred to as his theory of linguistic relativity. The answers to many of these questions are now to be found in Carroll's Introduction, and in the previously unpublished writings now made available for the first time. The remainder of the review will be limited largely to a discussion of this material.

Whorf's interest in linguistics had its roots in an earlier concern with apparent discrepancies between science and religion. Since he 'seriously believed that fundamental human and philosophical problems could be solved by taking a new sounding of the semantics of the Bible' (7), he sought as early as 1924 to prepare himself for this task by taking up the study of Hebrew. Shortly thereafter, he happened upon a book that by his own admission exerted a profound and lasting influence upon him, a two-volume work bearing the intriguing title La langue hébraïque restituée, written by Antoine Fabre d'Olivet and published in Paris in 1815–16. In this book Fabre d'Olivet 'attempted to show that the hidden meanings of the Book of Genesis could be elucidated by an analysis *au fond* of the structure of the triliteral Hebrew root. Each letter of the Hebrew alphabet, according to him, contained an inherent meaning; for example, the letter Aleph was to him "the sign of the power and stability of ideas, of unity and the principle which determines it."' (8).

Although Whorf did not accept the Frenchman's results nor particularly espouse his theory, he nevertheless was sufficiently impressed to refer to him as 'one of the most powerful linguistic intellects of any age' (9). He was especially intrigued by his method, which was roughly one of

comparing and contrasting a wide variety of roots containing the same letter or letters of the Hebrew alphabet. Whorf saw in this a sort of primitive technique for isolating phonemes and morphemes (75). Most of all he was taken with Fabre d'Olivet's bold and imaginative attempt to penetrate to the semantic core of speech.

When, two years later, Whorf took up the study of Nahuatl, Fabre d'Olivet's visionary lucubrations provided the impetus for an early theory to which he gave the name 'oligosynthesis.' An oligosynthetic language, he said, is one

> in which all of the vocabulary may be reduced to a very small number of roots or significant elements . . . (12). Each element . . . is, first, a very simple piece of articulation-behavior, and, second, a broad idea or complex of related ideas that goes with this piece of behavior. . . . It should now be noted . . . that this oligosynthetic phenomenon opens up certain new territories in the little-explored field of language-psychology. In it we see the whole ideational field of a language partitioned out among or shared between some thirty-five elementary notions, so as to give us for the first time a map or plan of an actual realm of ideas (25).

Carroll then goes on to point out (25 ff.) that from this notion of oligosynthesis, with its emphasis on phonetic symbolism, it was 'but a short step to the notion that languages with different collocations of semantic ideas might provide different 'maps' of the realm of possible ideas. . . .' (26). This step was eventually taken after Whorf took up the study of Hopi.

Even before his Hopi studies, though, Whorf had been keenly interested in the notion of a 'broad idea or complex of related ideas' which might be associated with a linguistic element (25). As early as 1927 in a letter to the psychologist Dr. Horace B. English, we find Whorf searching for an apt word to describe 'a kind of connection or relation . . . between ideas' (35). This letter, bearing the title On the connection of ideas and appearing for the first time in this volume, shows Whorf trying to set up a linguistic field in the manner of the German field-theorists, searching for a method whereby he could establish semantic relationships between concepts. Probably at about the same time—Carroll fixes the date at approximately 1927—Whorf reveals how an interest in Gestalt psychology contributed greatly to a clarification and sharpening of this method. In the brief series of comments entitled On psychology (hitherto unpublished), he says: 'Gestalt psychology does seem to me to have discovered an important truth about mind, the importance of configuration in the mental domain. . . . When we attempt to apply the configurative principle to the understanding of human life, we immediately strike the . . . linguistic . . . as the great field par excellence of the configurative on the human level' (41). The idea of a patterned relationship, therefore, linking together discrete lexical units into configurations was fully developed in Whorf's mind approximately ten years before he became absorbed in the specific problem of linguistic relativity.

In 1931 Whorf began studying under Edward Sapir. Their association had at least two happy sequels: Whorf was finally exposed to the methodological discipline he so sorely needed, whereas Sapir—with almost inspired prescience—saw fit to encourage his gifted student's interest in the Amerindian languages, especially Hopi. Although Whorf is best known today, in linguistic circles at any rate, for his work in Hopi, most of his researches in this field still remain unpublished. Other than the brief outline of Hopi grammar (written in 1939) included in Hoijer's Linguistic Structures of Native America, Whorf published only two articles on this subject: The punctual and segmentative aspects of verbs in Hopi, and Some verbal categories in Hopi. These two papers, however, are of critical importance, for—as Carroll says—'In these papers one can see how their author was beginning to be fired with the notion, developed more extensively in later popular-

ized papers, that the strange grammar of Hopi might betoken a different mode of perceiving and conceiving things on the part of the native speaker of Hopi' (17). Up until his analyses of Hopi, Whorf's illustrations of linguistic relativity were largely limited to what we may loosely call 'words.' He was very much aware of a causal relationship between conceptual and lexical fields; he saw clearly that there was such a thing as linguistic configuration, and yet, prior to his Hopi studies, he does not seem to have hit upon any explanation as to why these discrete lexical units are held to a specific pattern—a pattern which may change drastically from language to language. This phase of his development emerges clearly in another article that appears for the first time in the present volume, A linguistic consideration of thinking in primitive communities.

Whorf here attempts to describe the nature of the vitalism—the organic intelligence—that structures speech into fields or patterns, adopting for this purpose Carl Jung's division of the basic psychic functions into sensation, feeling, thinking, and intuition. Of these four areas Whorf believed thinking to be largely linguistic. He furthermore accepted Jung's definition of the libido, that it is an energic principle divided qualitatively and quantitatively into separate energy sections, and that none of the libido or energy within one system may be converted into that of another system unless there has been a full recession into the undifferentiated state. This 'linguistic' energy, therefore, is largely differentiated and generally non-transferable. Its principal function is to provide the 'fields of force' which link together the random motor impulses of speech into meaningful patterns and sequences: 'Words and morphemes are motor reactions, but the factors of linkage *between* words and morphemes, which make the categories and patterns in which linguistic meaning dwells, are not *motor* reactions; they correspond to neural processes and linkages of a nonmotor type. . . . (67).

To these factors of 'linkage' Whorf gives the name 'covert categories' or 'cryptotypes,' terms he develops more in detail in two other articles: Discussion of Hopi linguistics (a heretofore unpublished letter written in 1937 to Dr. Carroll) and Grammatical categories, composed in 1937 but not printed until 1945. A familiar example of a cryptotype would be gender in English, in which each common noun and personal given name is assigned to a certain gender, but an overt mark does not appear unless the noun is referred to by a personal pronoun in the singular number or—in the case of neuter nouns—by the interrogative and relative pronouns *what, which*. Gender in Latin, however, would be an 'overt catetory' or a 'phenotype,' since most nouns carry their gender mark. English adjectives offer another familiar instance of cryptotypes. The group which includes 'inherent' qualities (color, material, physical states, etc.) has the reactance of being placed nearer the noun than those adjectives which signify 'noninherent' qualities (size, shape, evaluation). The sequence of these two groups can be reversed only by altering the normal stress pattern—and even then reversal may not take place freely (90–93). It is quite interesting, incidentally, to compare this subjective, 'mentalistic' technique for determining adjective-classes and their syntactic sequences to the method used by Charles C. Fries (The Structure of English, chap. 10) in his analysis of the function and structure of modification.

By 1938 Whorf had developed his ideas on linguistic relativity to the point where one can properly refer to them collectively as a theory. Different languages segment and analyze experience differently because they are each cast in a certain mold. This mold, on the other hand, is of a two-fold nature: overt and covert, or to put it another way, each language has both a formal and a semantic structure (formal in-

cludes phonology and morphology). A full analysis of both is required if the linguist is to understand how a given language interprets reality. The ultimate application of this technique is suggested in Whorf's article Gestalt technique of stem composition in Shawnee (written in 1939), wherein he demonstrates with fascinating ingenuity how objectively verifiable distinctions between visual and non-visual experience provide material for the cryptotypes, which in turn force a language to specific types of formal structuring. And in a detailed outline—printed here for the first time—Language: plan and conception of arrangement, Whorf lists in a highly condensed fashion those features of the 'word' (as part of the sentence) and the 'lexeme' (the word or stem as an item of the vocabulary, and as a part analyzed or abstracted from sentence words) which must be studied in order to determine the structural semantics of a given language. The accepted methods for determining phonemic and morphemic structure are of course also included in this overall plan of language study. This phase of Whorf's research—his efforts to relate cryptotype and phenotype—should be of great interest to those who are primarily concerned with bridging the gap between semantics and structure, especially since one may assume, judging from the almost total lack of references, that the leading European semanticists are apparently unaware of Whorf's contributions to their field.

What direction would Benjamin Lee Whorf's thinking have taken, had he lived out his days? Would he eventually have become a sober-minded empiricist with strong leanings toward statistical methods of research, or would he have become ever more intuitive, more universal, more transcendental? He tells us what he considered the proper goal of linguistic research to be: 'The very essence of linguistics is the quest for meaning, and, as the science refines its procedure, it inevitably becomes, as a matter of this quest, more psychological and cultural, while retaining that almost mathematical precision of statement which it gets from the highly systematic nature of the linguistic realm of fact' (79). He wrote these lines in 1936. It is not without significance, however, that Dr. Carroll chooses as a concluding essay Whorf's article Language, mind, and reality, first printed in the January and April issues, 1942, of the Theosophist, a journal of the Theosophical Society with publishing offices in Madras, India. This is a strange and charming piece of writing, wherein Whorf hints that the very linguistic relativity which predicates such divergent world-views may itself be but a manifestation of a cosmic order of which the West with its limited perceptive powers is now only dimly aware:

> . . . the types of patterned relationship found in language may be but the wavering and distorted, pale, substanceless reflection of a CAUSAL WORLD. Just as language consists of discrete lexation-segmentation (*Nāma-Rūpa*) and ordered patternment, of which the latter has the more background character, less obvious but more infrangible and universal, so the physical world may be an aggregate of quasidiscrete entities (atoms, crystals, living organisms, planets, stars, etc.) not fully understandable as such, but rather emergent from a field of causes that is itself a manifold of pattern and order. . . . Science cannot yet understand the transcendental logic of such a state of affairs, for it has not yet freed itself from the illusory necessities of common logic which are only at bottom necessities of grammatical pattern in Western Aryan grammar . . . (269).

I found very few compositional errors. On page 89, line 16, '. . . certain types of sentence . . .' should perhaps read '. . . certain types of sentences . . . ,' although this may simply be the way Whorf wrote it. There seems to be a word missing in the sentence beginning on line 11, page 176: 'From this proceeds his type of objectivity, an earnest [?] that his reading will not be affected. . . .' *Sitzenfleisch*, page 197, line 4. should read *Sitzfleisch*.

UNIVERSITY OF SOUTHERN CALIFORNIA

LINGUA POSNANIENSIS, Revue de Philologie Comparée et de Linguistique Générale. Poznań (Poland): Société des amis des sciences et des lettres de Poznań. Vol. I–V, 1949–1955.

DELL H. HYMES

Since it began in 1949, this Polish journal has had something of Americanist interest in each annual volume. Languages of publication are Polish, French, German, English and Russian, with the first three predominant, Russian and English rare; but papers of direct interest to anthropological linguists have been exclusively in French or English.

Such papers are: Loukotka, Sur quelques langues inconnues de l'Amérique du Sud, 1.53–82 (1949); Loukotka, La parenté des langues du bassin de Madeira, 2.123–144 (1950); Milewski, La structure de la phrase dans les langues indigènes de l'Amérique du Nord, 2.162–207 (1950); Loukotka, Supplementary Notes to the Classification of Australian Aboriginal Languages, 3.135–157 (1951); Milewski, The Conception of the Word in the Languages of North American Natives, 3.248–268 (1951); Loukotka, Review, J. Alden Mason, The languages of South American Indians (from Bulletin 143, Handbook of South American Indians, Vol. 6, pp. 157–317) 3.366–375 (1951); Milewski, Phonological Typology of American Indian Languages, 4.229–276 (1954); Loukotka, Les Indiens Botocudo et leur langue, 5.112–135 (1955); Milewski, Comparison des systèmes phonologiques des langues caucasiennes et américaines, 5.136–165 (1955). First Loukotka's papers, then Milewski's, will be reviewed.

Loukotka (1949) gives short word lists for a number of South American languages: Mako (24), Hairúya (28), Mikirá (29), the Sečura family (Sečura proper, Kolan, Katakao, 39 each), Kulli (55), Hibito and Čolon (39 each), Morotoko (13), Payagua (33), Mbühá (82), Teréno (105), Kinikiáo or Konikináo (53), Kepkeriwát (47), Katauiší (18), Šukurú (21). For a number of entries, suggested cognates in other languages are given. A bibliography lists 31 published works, plus 9 manuscripts, together with the present location of these last. Loukotka's introduction to the lists discusses the present state of South American linguistic studies, emphasizing the paucity of adequate data.

Loukotka (1950) begins with an appraisal of recent work by others, concerning Chibchan relationships. According to Loukotka, Rivet has demonstrated the Chibchan connection of Cholón and Xibito; Jijón y Caamano has given sufficient evidence to link the Esmeralda and Yaruro languages to each other and Chibchan, so also the Murato or Chirino group. (The latter's linking of the Meso-American family Mískito - Matagalpa corresponds with Loukotka's own unpublished studies, but his arguments for relationship of the Timote, Sebondoy and Muchik families are found not persuasive enough). Rivet has promised to publish proof of the Chibchan affinity of Mašubi, spoken on the middle course of the Mequens river, Matto Grosso, Brazil; the only known document, the vocabulary of one Colonel Fawcett, is still in manuscript. Finally, Levi-Strauss has studied the mutual connections of Chibchan and Nambikwára. All this is said to show that peoples of the Chibchan group were dispersed from the Gulf of Mexico to central Brazil; but between the southernmost known members (Cholón and Xibito) and the Nambikwára group is a gap too great to be passed over without mention, namely, the vast Madeira basin. (The Madeira is one of the great Amazon tributaries; the area involved is most of Bolivia, northeastern Peru and the Brazilian states Matto Grosso and Amazonas).

Loukotka gives a list of all the known languages and tribes in the region, organized in four parts: (A) Small Autochthonous linguistic families: Amniapé (4), Chapakura (22), Chikito (1), Huari (7), Kapišana (2),

Makuráp (2), Mosetene (2), Múra (3), Nambikwára (4), Yabutí (2); (B) Isolated languages (12); (C) Large groups: Arawak (29), Aymara (1), Karaib (3), Kičua (1), Pano (9), Samuku (1), Tupí (23); and (D) Languages not classified (13). Some geographical and other information is added for each language. (Number of languages comprised is totalled in the parentheses). This 12 page listing is said to show not only the great linguistic 'crumbling' in the Madeira basin, but also the quantity of independent groups into which scholars have classified the languages.

A comparative vocabulary pairs off forms in various Chibchan languages with forms from assorted Madeira basin languages for 59 meanings cited in French. Sometimes only one language is cited for a given meaning on each side, sometimes several. Loukotka tabulates that of the Madeira languages, Kaničana figures 23 times in the comparisons, Mobimi 17, Kayuvava 10, Toyeri 8, Itonama 8, Yurakare 3, and others less. He believes that while no genetic relationship is demonstrated, a passage has been found which removes the gap between Cholón-Xibito and Mašubi-Nambikwára. In the 31 item bibliography are some entries designating material known to Loukotka by his extracts from unpublished manuscripts.

Loukotka's review of Mason (1951) defends his own South American classificatory work and points out deficiencies in Mason's; his sum judgment is 'this excursion of a Meso - American specialist into South America has not succeeded.' Loukotka fills some five pages with sources and languages not mentioned by Mason, plus some resultant errors of classification and geographical placement. The bibliography, he finds, is of little or no use to the student because of its incompleteness. He objects to mixing together as 'not classified' both languages about which nothing is known and isolated languages for which data exists; the latter should be classified, even if tentatively and as unique stocks. Again, Loukotka finds charges of error in classification, or of 'radical' vs. 'conservative' treatment, to be of no scientific value when not accompanied by details. Reversing appellations, he himself finds some of Mason's macro-phyla 'radical' from his own, perhaps 'conservative' view.

Loukotka (1955) surveys the known materials on Botocudo. He offers a short table of comparisons among the Botocudo dialects (forms for *head*, *tooth*, *water*, *fire*, *day*, *earth*, *bow*, *jaguar*, *bird*, *white*, *one*); there is also a comparison of Gueren, taken from the dictionary of a botanist (Schott) who visited Brazil in 1815–17 with Prince Maximilian de Wied, and Botocudo on 24 items. Short separate comparisons are given for lexical items in Botocudo and Kaingán (26), Coroado (24), Kamakan (23), Gê (23), Mašakali (10), Opaie (8), and a miscellaneous group (Matanawi, Mašubi, Tauité, Patašo, Kariri, Otuké, Yaruro, Hahaháy, Umotina, Mura Bohura, and Piároa), each on one, two or three items. The only evaluation made is that one finds in Botocudo borrowings or analogies vis-a-vis the families named in the numbers cited. A bibliography concludes the paper; to item 60 should be added a modern edition, Maximilian Prinz zu Wied: Unveröffentliche Bilder und Handschriften zur völkerkunde Brasiliens, Röder und Trimborn (Born: Dümmlers Verlag, 1954).

Loukotka (1951) 3.135–157 is a classificatory venture into another sparsely known continent. Starting from Father Schmidt's Gliederung der australischen Sprachen (1916), long a basic work, it takes account of new languages and sources unknown to Schmidt, or, in a few cases, not included by him. This has, writes Loukotka, 'radically changed the geographical picture of the extension and distribution of Australian languages.' A linguistic map is inserted which, having been drawn according to the plan of Schmidt's, shows the changes clearly. Loukotka says his map follows

Milewski's general classification into six groups (in the atlas, Vol. II, of Milewski's opus, *Zarys jezykoznawstwa ogólnego*); the map itself shows seven major groups, Paleo-australian, Western, South-Central, North-central, Eastern, Peripheric, and Northern. The bulk of the paper is a list of the Australian languages, with commentary on the differences from Schmidt in languages and sources included. Where the map follows Milewski, the list itself is organized according to Schmidt's general division into Northern and Southern (apparently, like the plan of the map, as an aid to comparison with Schmidt).

A separate of Milewski (1950) has been reviewed by C. F. Voegelin (Lg 28.405–410). As an attempt to classify pronominal systems, it proceeds strictly descriptively in contrast to the ad hoc etymologizing of Forchheimer's The Category of Person in Language. Both are inadequate to the actual diversity of Amerindian languages, a point made re Milewski by Voegelin and re Forchheimer by myself (IJAL 21.294–300, 1955). The best comments on the study of the category of person, however, are made by F. W. Householder, Jr. in his review of Forchheimer (Lg 31.93–100, 1955).

The concept 'word' has been attacked on the ground that no general definition for all languages can be given. To this has been replied that a definition for any one language can be given. Milewski (1951) argues that if the same general definition for all 'words' within one language cannot be given, the concept should not be used. All languages are said to have morphemes (minimal morphological units), clauses (maximal internally related morphological units), and syntactic groups (intermediate in length, morpheme sets functioning together, e.g. as predicate). For Milewski, 'a word is a syntactic group formed according to the pattern of all the syntactic groups of the given language.' The criteria may be morphological, phonological, morphonological, singly or jointly. If criteria for delimitating one syntactic group (such as predicate) differ from those for others, they are said to be only criteria for predicate, etc., not for words. Such a language is wordless.

Word languages are classified by three main principles: agglutination (no accumulation of semantic functions within particular morphemes of a word, e.g. Turkish); flexion (cumulation of grammatical functions within non-stem morphemes, e.g. Latin); and alternation (cumulation of all functions, lexical and grammatical, within the stem itself, e.g. Arabic). Applying his schema to North America, Milewski recognizes five types: (1) wordless languages, (2) with weak word development, (3) agglutinative polysynthetic, (4) agglutinative non-polysynthetic, and (5) agglutinative-alternative. Milewski distinguishes (3) and (4) as 'languages with a morphological conception of the word' (polysynthetic) and 'languages with a phonological or morphonological conception' (non-polysynthetic).

Using the Boas Handbook and Hoijer's Linguistic Structures of Native America, Milewski makes the following classification: (1) Na-dené ('each type of those groups, predicative and non-predicative, may be distinguished by the order of morphemes, peculiar for each type' but 'there is no general means of distinguishing syntactic groups'); Maidu, Takelma, Hopi, and some Siouan dialects. (2) Tsimshian, Nass, Siuslaw, Coos, and Chinook, as well as Coeur d'Alene, Yuma, Taos, Yuchi, and Tunica; some word features are said to appear characterizing all syntactic groups (e.g. main stress) but so vaguely defined and so few that we cannot speak of words being distinguished within the clause. (3) Only within Algonkin-Wakashan (Quileute, Kwakiutl, Fox, Delaware) and Eskimo-Aleut (specifically Greenlandic). Delimitation is by a class of initial morphemes (Quileute) plus stress and internal sandhi (the remainder). (4) Aztec, Zuni on phonological grounds (stress, internal sandhi), Tonkawa

on morphonological grounds (the vowel alternations in the root counted from the beginning of the word). (5) Yokuts, deemed the most exceptional North American language, much closer to the type of IE and Semitic, both for stem alternation and 'eccentric' clause structure. (Here eccentric means subject, object, predicate equally constitute the sentence, each characterized by its own morphological form, as opposed to concentric structure, where the predicate is the main constitutive part; see Milewski, 1950.) Milewski concludes that on the whole the word is not outlined distinctly in North American languages, and that this, beside concentric clause structure, is another structural characteristic peculiar to most North American languages.

Milewski (1954) begins with Jakobson's primary phonological elements (in Kindersprache, Aphasie und allgemeine Lautgesetze). The minimal system composed of these is not found in known languages, though some (e.g. Arunta, Lule [north Argentina]) approach it. Existing systems either lack phonemes from the minimal system (extremely rare), or develop it in some direction (all known languages). Essential lines of development are said to be peculiar to whole groups of languages, and such a group is a phonological type. In the New World Milewski recognizes two main types, dubbed Atlantic and Pacific, plus an intermediate central type. Atlantic type languages tend to develop their vocalic systems and nasal consonants, not their oral consonant systems; Pacific type languages tend to develop their oral consonants, leaving vowels and nasals weakly developed.

In distribution the Atlantic type is said to occupy the whole eastern part of South America, mainly lowland, the drainage area of the Orinoco, Amazon, Sao Francisco, Parana and Uruguay, and part of the Andes foothills. There are two sets, dialects with oral consonants from 37% to 44.4%, (Tupí-Guaranian family), and Ge, Carib and Arawakan languages with oral consonants from 46.1% to 53.0% of the phonemic systems. In MesoAmerica, Bribri, Mosquito, Temoaya, Masquital, Mazahua and Mazateco, Zoque and Mixe are Atlantic type. In North America the type is found between the Great Lakes and middle course of the Mississippi, and the Atlantic, including Tunica, Choctaw, Koasati, Iroquoian, Cherokee, Delaware, and Shawnee.

The Pacific type has a percentage of oral consonants from 65.0 to 84.9, and includes Kutenai, Fox, Wichita, Zuni, Tonkawa, Kwakiutl, Nass, Yuma, Lutuami, Hupa, Tsimshian, Siuslaw, Yokuts, Haida, Coos, Coeur-d'Alene, Quileute, and Tlingit in North America; Maya-Yucatec, Lacandón, Tzeltal, Tsotsil, Tojolabal, Quiché, Huasteco (Maya-Quiché family), Azteca and perhaps Tarasco, Totonac and Tepehua (Aztec-Tanoan), Chontal, and Zapotec. Prosodic opposition of length is said to occur almost constantly in languages of the Pacific type.

In the intermediate central type are either languages with a percentage of oral consonants as low as Atlantic (36%–75%), but at least one characteristic Pacific feature, or languages with oral consonant percentage like Pacific type (65%–85%), but at least one Atlantic feature. These features are advanced as characteristic of the two types, and as the essential means by which the hypothetical minimal system has been elaborated. Pacific features are (1) palatal vs. velar orders (e.g., /k/ vs. /q/); or (2) labialization (/k/vs. /k^{w}/); or (3) three consonant series (/b/:/p/:/p$^{?}$/), or (4) developed system of laterals (ɬ, Ł, Ł$^{?}$). Atlantic features are (1) five distinctive degrees of aperture among vowels; or (2) three or four distinct classes of vowels; (or (3) nasal vowels; or (4) nasal continuants vs. nasal plosives. (/m, n/:/mb, nd/). The central type is said to occupy the western band of South America, and the Andes foothills up to the Isthmus of Panama, including Ona, Yamana, Alacaluf, Tehuelche, Kaskihá, Paez, Cashibo, Cuna,

Gualaquiza, Kágaba, Quechua, Aymará. In MesoAmerica only Mixtec is this type. In North America on the west coast are Maidu, Takelma, Chinook; also Hopi, Taos, Atakapa, Dakota, Apache, Chitimacha, Navaho, Yuchi, Chipewyan, Eskimo-Aleut, as well as Chukchee, Kamchadal and Koryak of northeastern Asia. The Atlantic type is said to be an older stratum in Meso-America, the Pacific type a new stratum.

Later (Milewski, 1955), a Caucasian phonological type is defined (assimilating to itself the 1954 Pacific type), characterized by predominance of oral consonants (more than 70%); at least two dorsal consonant orders (especially /k/:/q/); at least three consonant stop-affricate series, especially including glottalization. So far as Milewski knows, phonological systems comprising all three traits are found in only two areas: among Caucasian languages, and among Amerindian languages spoken along the Pacific between 40 and 60 degrees of north latitude and between 4 and 30 degrees of south latitude. Schematic tables (by position and series) present four Caucasian subtypes for languages of the Caucasus, seven for Amerindian languages. Voegelin's formulaic counts for number of phonemes are adopted, and the data are corrected from the 1954 paper to accord with Voegelin's presentation in Inductively Arrived at Models for Cross-Genetic Comparisons of American Indian Languages (UCPL 10, 1954, 27–45). A table lists 27 other Amerindian languages showing four (2), three (9), two (6) and one (10) of the Caucasian features.

A formula for phonological resemblance is presented: $(A - B) \div (A + B) = X$, where A is the sum of the phonemes having equivalents in the two systems, B the sum of the phonemes without equivalents in the second language, and X the index of phonological resemblance between the two languages. A large table (inserted pp. 128–129) gives the index of resemblance in occlusives between all pairs of ten Caucasian and twelve Amerindian languages; a chart indicates those where resemblance is from .70 to 1.0 (black squares), from .40 to .69 (white squares), and below .40 (blank). Within the Caucasian ten (Oubykh, Awar, Andi, Artchi, Lak, Tchétchène, Thabassaran, Koubatchi, Dargwa, and Géorgien-Qabardi-Routoul), and within the Amerindian twelve (Lutuami, Quechua-Aymara, Haida, Coeur d'Alene, Quileute, Siuslaw, Coos, Chinook [promoted from intermediate central in 1954], Kwakiutl-Tsimshian, Nass, Tlingit, Hupa), the index runs high. Out of 120 comparisons between each language of one group with each of the other, the chart shows only 5 in the range .70 to 1.0, 51 in the range .40 to .69, 64 below that range (4.2%, 42.5% and 52.5% respectively). It hardly seems justified to conclude that languages of Caucasian type in the Caucasus and America constitute a quite united ensemble from a typological viewpoint, when more than half the comparisons are in the lowest range by Milewski's own index.

Another conclusion is that the least developed systems in both areas are most similar, having generally the same phonemes, while the richest systems show many features found only in one of the two areas. Trubetzkoy's remark that the Caucasian languages represent diverse combinations of the same basic elements is enlarged to include Milewski's Caucasian type in America as well; these basic elements are now said to be (a) voiceless, voiced and glottalized series, and (b) eight articulatory positions (i.e., p, t, c, č, Ł, k, q, ?). Coeur d'Alene most closely approaches the theoretical whole, lacking only dž and g. While not all these positions are found in the languages discussed, Milewski finds it permissible to suppose that formerly they appeared nearly everywhere.

The contents of these papers have been carefully summarized because the original journal may be difficult of access to many scholars. Critical comment will be restricted to a few general points.

Loukotka works much in the manner of Daniel G. Brinton's papers on South American languages, published in the Proceedings of the American Philosophical Society in the 1890's. No attempt is made at phonemic analysis, nor are sound correspondences even suggested; the criterion for classification is simply inspection. It may be said that John Howland Rowe has found Loukotka's South American classification in many respects more reliable than Mason's and 'the best one available at present.' (Rowe, UCPL 10, 1954, 13–26). It is valuable to have a European scholar who seeks out the data scattered among European libraries and manuscripts, since for many languages it is all we shall ever have. Classification on such a basis, however, soon gives diminishing returns.

As against Loukotka's concern with genetic classification and rescuing data, Milewski attempts very general studies with a typological and areal orientation based on standard sources. The 1954 paper shows in its bibliography attention to IJAL and other journal sources; the preceding papers have a sample comprising the Boas Handbook and Hoijer's Linguistic Structures of Native America. Milewski gives considerable attention to the details of the languages he treats; still, the number of languages treated seems hardly enough to reduce New World diversity to five word-types, three phonological types, and four syntactic types.

Regarding the 1953 paper, I would say that what Milewski deals with are not criteria for the presence or absence of word-units, but very general criteria for the kind of word-units in a language. When one has delimited Milewski's predicate, etc., as morpheme groups within the clause, and finds them consistently so delimited in texts and by informant's responses, no purpose is served by withholding the term word. One may not be able to speak of the Navaho word, or the Chinookan word (languages without words, and with weak word development, for Milewski), but one can speak of the noun-word, the verb-word, etc., as in my grammar of Kathlamet Chinook, where the four major word-classes are the organizational focus. In Athapaskan Hoijer has a general schema for the word, as a matter of fact. Re Tunica, called 'the most interesting of the languages with weak word development of North America,' nothing is said of Haas' own criteria for words (morphological for major classes, syntactic for sub-classes). The weakness of the argument seems especially clear in these ambiguous cases of type (2), languages with so-called weak word development, where 'they do and they don't' according to Milewski. All languages, then, have units which may feasibly be called words. Milewski has highlighted some characteristic differences in these units among a number of Amerindian languages.

Regarding the typological papers of 1954 and 1955, it must be said that the data for some of the most-used languages are inadequate and need further analysis. Thus Chinook and Siuslaw do not belong to the Pacific or Caucasian types at all, since phonemic analysis shows neither has a voiced series, and Siuslaw has only dorsal /k/; Frachtenberg's q is allophonic, primarily before /a/, sometimes mishearing. (Suggested by Morris Swadesh, checked by myself in 1954 fieldwork.) Phonemicization being what it is at present, any typological scheme which depends on a mere three features is insecure; it suggests Dixon's attempt to classify the races of mankind by three anthropometric indices. Thanks to Milewski's careful chart, one sees that more than half the two at a time comparisons of Caucasian and Amerindian languages show no special resemblance by Milewski's own index and scale. Besides, a check is needed with calculations for other groups, including known genetic families, to assess the historical significance of any such percentages. Recalculation of consonant percentages by my own phonemicization for Chinook and

Siuslaw show both still high (Chinook 78.2 instead of 77.3, Siuslaw 75 instead of 78.8). But Milewski reads historical significance into small differences of percentage, and the ordering of languages by their percentages. This will not do, when some of the material is not phonemicized, and the rest phonemicized by who knows what variety of criteria. Again, Milewski reads historical significance into the presence or absence of a single typological feature, yet phonemic analysis invalidates a number of statements about the membership of types and subtypes. We have seen that Chinook, assigned a special place as the only member of Caucasian type VA (A for American) in 1955, is not Caucasian at all by Milewski's criteria. In the 1954 paper, Chinook was placed in the central type, because of its 'only Atlantic feature . . . opposition between continuant nasal *m* and plosive *mb*'. This derives only from Boas' phonetic remarks about the semi-consonantal character of Chinook /m/; Boas never failed to write correctly /m/, though Gibbs' early vocabulary shows some cases of b for /m/.

Geographical relationships are misleadingly foreshortened, when 'idioms near one another from a geographical point of view' are Coeur d'Alene, Quileute and Siuslaw, with an implication of inter-influence. Generally the phonological similarities and dissimilarities are treated as showing areal affiliation, but on a high level of abstraction from actual location, other intervening languages, the full distribution of the features concerned, and the social-cultural context of the relations between speech communities. The role of genetic connection is omitted, yet the only sound, fruitful way to analyze the salient resemblances which Milewski shows to exist is in the light of known genetic relations. What, for example, is the explanation of Penutian Maidu and Yokuts having only one Caucasian feature, while more northerly Penutian languages are included in the Caucasian type? Has the differentiation taken place within the New World, and if so, which represents the archaic type, if either does? Need an Old World, hence older, source for the Caucasian features of Coos, Lutuami, etc., be postulated at all? But of such questions there is no hint; time perspective is ignored. This is the common failing of such efforts at flat, sweeping areal interpretations, abstracted from the concrete conditions and historical development of the languages involved.

The general tenor of Lingua Posnaniensis is traditional historical linguistics, almost wholly Indo-European, e.g. a new etymology for Goth by Otrebski (2.70–98) or Otto Haas, Die Entstehung der Runenschrift (5.41–58). Some attention to American linguistics is shown in a review of Pike's Phonemics; the reviewer, L. Zgusta, 'agrees with Joshua Whatmough in rejecting the hybrid form "phonemic, phonemics" used by Pike and other scholars' in favor of phonematics. A necrological note on Holger Pedersen expresses gratitude for his interest and willingness to publish in a Polish journal not easily accessible to scholars; the editor pledges to keep the journal as Pedersen had wished to see it.

It is to be hoped that the pages of Lingua Posnaniensis will continue to see contributions to Americanist studies.

HARVARD UNIVERSITY

LANGUAGE INDEX FOR VOLUME 22[1]

Acuera 99, 100
Aguacatan 72
Aguacatec 72, 191f.
Algonquian 49, 51
Algonquian (Central) 202f.
Apachean 220f.
Apalachee 97, 100
Arapaho 49, 151f., 266f.
Arapaho (Northern) 49
Arvaca 182
Arawacoe 182
Arawagoe 182
Arawak 37, 182
Arawakan 181f.
Athapascan 219f.
Athabaskan 45
Aztec-Tanowan 186, 187
Beaver 220f.
Cabre 180f.
Cakchiquel 191f.
Calino 180f.
Calusa 97
Carib 180f.
Carib (Black) 1, 39, 139, 182, 183
Carib (Island) 1f. 138f. 189
Carib (Honduras) 138
Carib (Dominican) 30, 140, 143
Cariban 37, 181f.
Carinepagoto 180f.
Cayuga 107
Carrier 220f.
Chalchitan 72
Chaneabal 191
Chanabal 191
Chasta-Costa 232
Chatino 74, 113f.
Cherokee 88, 107
Chicomuceltec 191f.
Chinook 186, 187, 238f.
Chipewyan 45f., 220f.
Chiricuahua 220f.
Chol 191f.
Cholan 194
Chontal 191f.
Chorti 191f.
Chuh (Chuj) 191f.
Ciboney 182
Ciboney (Haiti) 181
Ciboney (Cuba, Isle of Pines) 181
Ciguayo 180f.
Comanche 213, 214
Coos 186
Costanoan 107
Cree 202f.
Creole (Dominican) 9, 34, 189
Delaware 189
Eskimo (Alaskan) 189
Eskimo (Proto) 196
Eyak 45f.
Fox 202f.
Galice 220f.
Goajiro 183
Guaccaiarima 181
Guislawan 186
Hare 220f.
Hebaio 182
Hopi 77, 106f., 186, 187
Huastec 191f.
Huastec (Veracruzano) 194
Huastec (Potosino) 194
Huastecan 194
Huasteco 76
Hupa 47, 220f.
Icafui 99, 100
Igneri 180
Iroquoian 88f.
Iroquois 106, 107
Iroquois (North) 107
Itafi (Icofui) 100
Itza 195
Ixil 191f.
Jacaltec 191f.
Jaoe (Yao) 182

[1] This index lists only American Indian languages; the numbers refer to pages in Volume 22 of IJAL. Numbers followed by f. indicate that the language is mentioned not only on the page given, but also in the following pages of the same article or review; so also, if the language forms the main topic of the article or review, it is indexed by title page reference, with f.

Jicarilla 220f.
Kalina 37, 39
Kanhobal (Jacaltec) 191f.
Kanhobalan 195
Kariphuna 183
Kathlamet 238, 240
Kato 220f.
Kekchi (Quekchi) 191f.
Kekchian 195
Kiowa 117f.
Kiowa-Apache 224
Kickapoo 202
Kutchin 220
Kutenai 196f.
Kwakiutl 186, 187
Lacandone 191f.
Lengua 189
Lipan 220f.
Lokono 39, 182, 183
Lucayo 180, 182
Luiseno 106, 108
Macorixa (Macoriga) 182
Macorixa (Cuba) 181, 183
Maidu 107, 186, 187, 233f.
Maisi 181
Mam 191f.
Mamean 195
Mamoid 192
Mattole 45f., 220f.
Maya 184f., 195
Maya (Highland) 191
Maya (Lowland) 191
Mayaca 99
Mayaguaca 99
Mayan 72, 73, 191f.
Mayan (Proto) 192, 193
Maxahua 208f.
Mazahua (Proto) 210
Mazatec 57
Mazatec (Huautla) 58, 70, 71
Mazatec (Soyaltepec) 57
Mazateco 136, 196, 244
Menomini 202f.
Mescalero 224
Miwok 107
Mixtec 58
Mocama 99, 100
Mococo 99
Mohawk 89, 92, 107
Mopan 191, 195
Motiloni (Carib) 196
Motozentle 191f.
Muesha (Arawak) 196
Muskogean 98
Na-dene 47, 220
Navaho 45f., 81, 187, 22f.
Nisenan 234, 237
Nootka 90, 186f.
Nepoyo (Nepoye) 182
Ocale 99, 100
Ocita (Pohoy) 99
Oconi 100
Ojibwa 202, 206
Ojibwa (Eastern) 202
Omtilone 137
Onatheaqua 99
Oneida 88f., 107
Onondaga 89, 107
Otomi 208, 209
Otomi (Southwestern) 210
Otomi (Central) 210
Paiute (Northern) 186
Pame 208
Pame (Otomi) 242f.
Paraujano 183
Patowatomi 202, 206
Penutian 107, 110, 187, 233, 238
Pohoy (Ocita) 99
Pokomam 191, 195
Pokonchi 191f.
Potano 97f.
Quechua 189
Quekechi 191, 192
Quichi 191f.
Quichean 195
Auichoid 192
Quileute 187
Rabinal 195
Sahaptin (Northern) 186, 187, 239
Salish 239
Salvaio 182
San Carlos 220f.
Sarcee 45f., 220f.
Saturiba 99, 100
Seneca 94, 107
Sepoye 182

Shawnee 202f.
Shebayo 181
Shoalwater (Lower Chinook) 240
Shoshonean 108
Siouan 94
Solomec 195
Surruque 99
Tacatacuru 99
Tacaboga 99, 100
Taino 180, 183
Taino (Macro) 183
Taino (Sub-Taino) 180, 182
Tanowan 180
Tanowan (Proto) 186
Taos 186
Tawasa 99, 100
Tewa 186
Timucua (Mocama dialect) 97
Toholabal 191f.
Toreva (Hopi) 108
Tsimshian 186, 187
Tsotsil 73
Tubatulabal, 106f.
Tucururu 99, 100
Tzeltal (Tzental) 191f.
Tzentalan 195
Tzotzil 191f.
Tzutuhil 191f.
Unsaliq 196
Urubia 99
Uspantec 191f.
Utina 97, 99, 100
Uto-Aztecan 108, 186
Wailaki 45f.
Wasco 186, 187, 238f.
Wintun 107
Wishram 238f.
Witoto 131f.
Yokuts 82
Yucatec 191f.
Yufera 99, 100
Yui 99, 100
Yustaga 99, 100
Zuni 82, 217